CATALOGUE OF

MINERALS.

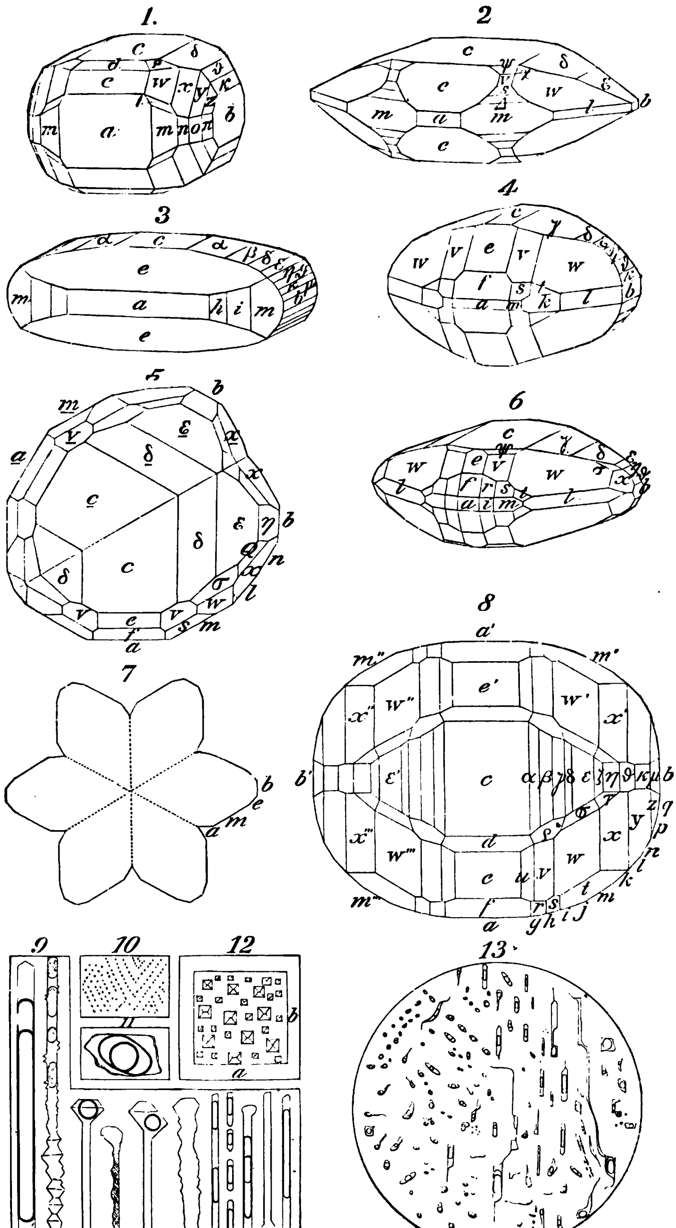
GEO. L. ENGLISH & CO.

Wm H Hobbs
June 9th, '90.

COMPLIMENTS OF

GEO. L. ENGLISH & CO.

Wm H Hobbs
June 9th, '90.



BERYLLONITE.

NEAR STONEHAM, MAINE.

See Page 18.

GEORGE L. ENGLISH, } Philadelphia.
EDWIN C. ATKINSON, }

WILLIAM NIVEN,
New York.

CATALOGUE

OF

MINERALS

FOR SALE BY

GEO. L. ENGLISH & CO.

1512 CHESTNUT STREET,
PHILADELPHIA;

739 AND 741 BROADWAY,
NEW YORK.

CABLE ADDRESS: ENGLISH, PHILADELPHIA.

FIFTEENTH EDITION.
JUNE, 1890.

Introduction.

MINERALOGY has kept pace with allied sciences in the advances of the past ten or twenty years. The very great increase in the demand for mineral specimens, and the general centering of the business in the United States upon our house, have created a demand for a more elaborate catalogue of our stock, which we have endeavored in our present issue to satisfy.

It is our earnest desire to have an unsullied reputation for integrity and justice, as we believe that upon no other basis can a permanent business be built up. The attention of parties who do not know of our standing is respectfully called to the list (on the following page) of distinguished mineralogists who kindly permit us to use their names for reference.

The liberal support given us in the past has encouraged us to very materially increase our stock as well as our facilities for promptly filling the large orders entrusted to us. At the present time we have no hesitation in claiming that our stock is the largest, finest, most complete in species, and in every way the best, in the United States. The recent consolidation of the houses of George L. English & Co., of Philadelphia, and William Niven, of New York, into a new firm to be known as George L. English & Co., is already being recognized as a move to place the mineral business in the United States on the highest plane. It will be the constant aim of the new firm to keep *no poor material,* and while our efforts to secure the choicest of everything often compel us to buy at much higher prices than are commonly asked, an examination of our catalogue will show that our prices are almost invariably as low as or lower than those of other dealers, while the superiority of our material cannot fail to be noticed. This is because we study carefully the needs of all classes of our customers, confine our business wholly to mineralogy, and secure our material direct, personally, or by experienced assistants, visiting the localities and purchasing desirable material in large quantities.

References by Permission.

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Specimens on Approval.

WE will send specimens on approval to colleges, scientific societies, parties favorably known to us, and to such others as furnish satisfactory references.

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PAYMENT must accompany orders from parties unknown to us, or those not furnishing satisfactory references. *Money will be refunded* for all material which does not prove satisfactory and is returned to us in good condition, prepaid, within ten days of date of shipment.

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" " 3x4, " 100, ...	1 00
" " 4x6, " 100, ...	1 25
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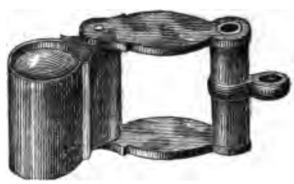
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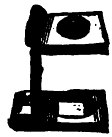
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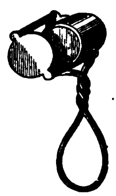
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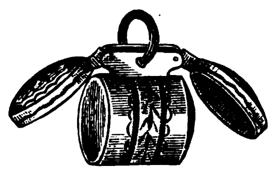
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HINTZE'S HANDBUCH DER MINERALOGIE (in German), published in parts, the entire work to be completed in three or four years. This is the most elaborate work on Systematic Mineralogy ever written, and has met with universal commendation. Parts I. and II. are now out; Part III. is expected by June, 1890. Subscriptions for the entire work will be received by us. Price of each Part, ... 1 85

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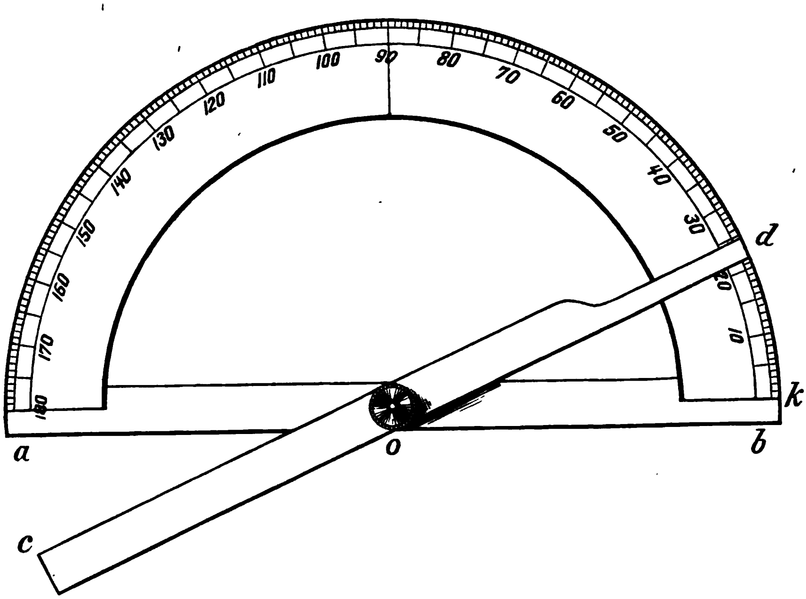

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If you do not see what you want mentioned above, write to us, and you will find that we can fill your order better than any house in the country and at a lower price.

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These are not mere scraps, so small as to be of no service, but *characteristic massive specimens of good size*, which can be broken up as may be desired for practical laboratory work. We have spared no effort to secure the purest material obtainable, and, as we purchase in large quantities whenever possible, we feel confident that we can supply our customers not only with much better material, but, as a rule, our prices will be found lower than those charged by other dealers for inferior material. Minerals sold by the pound are wrapped in separate packages, each being carefully labeled with name and locality. Where not otherwise noted in the following list the minerals are practically pure, or as pure as can be secured. Customers desiring fractions of a pound of any minerals on this list will be supplied at proportionate rates, except that no charge of less than five cents will be made.

Prices quoted are per pound avoirdupois.

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Agate, Brazil	10
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Albite, extra good, Va.	25
" Cleavelandite, Me.	10
Allanite, Va.	15
" Texas (new variety)	1 00
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Amphibole, Conn.	05
" Canada	10
Anhydrite, N. B.	10
Anthophyllite, Hydrous, Pa.	10
Anthracite, Pa.	05
Apatite, Canada	05
Apophyllite (on rock), Pa	50
Aragonite, best xled, England	1 00
" Flos Ferri, N. M.	25
Arsenopyrite, best, England	20
Asbestos, N. C., extra	15
Astrophyllite (in rock), Colo.	50
Azurite, Arizona	50
Barite, Va.	05
Berthierine, France	1 00
Beryl, Conn. and Me.	15
Beryllonite, Me., per oz.	2 50
Biotite, Canada	20
Blende, gray, massive, Pa.	20
" extra cleavable, Mo.	10
Boltonite, Mass.	10
Bornite, Canada	75
Bournonite, England	1 50
Brucite, N. J. and Pa	75
Calamine, Mo.	10
Calcite, N. Y.	05
" blue, N. Y.	25
" orange, N. J.	20
Cancrinite (in rock), Me.	20
Cassiterite, England	25
Celestite, extra cleavable, L. Erie	10
" Texas	05
Cerite, Sweden	1 00
Cerussite, Arizona	75
Chalcanthite, Arizona	1 50
Chalcocite, England, xled	1 50
Chalcophanite, N. J.	25
Chalcopyrite, Pa.	05
Chlorite, see Prochlorite.	
Chromite, Pa.	15
Chrysocolla, Arizona	50
Chrysotile, Quebec	25
Cinnabar, pure, Cala.	1 00
" rocky "	50
Cleavelandite, Me.	10
Colemanite, Cala.	50
Columbite, Conn.	1 00
Copiapite, Chili	1 00
Copper, some rock, L. S.	30
Corundum, granular, Ga.	15
" extra, cleavable, N. C.	25
Crocidolite, Quartz pseudo of, Africa	25
Cryolite, Greenland	15
Cuprite, some rock, Arizona	75
Cyanite, pure, N. C.	15
" in rock, Conn. and Pa.	15
Damourite, Me.	20
Datolite (on rock), N. J.	75
Descloizite, pure	2 00
" and Vanadinite, partly powdered	50
Deweylite, with Magnesite, Md.	25
Dolomite, N. Y.	05
" Me.	10
Dufrenite, Va.	15
Elæolite, some rock, Me.	25
" pure, Ark.	25
Embolite, on rock, N. M.	2 00
Emery, Smyrna	10
Enargite, Utah and Mon.	1 00
Epidote, Me.	15
Feldspar, extra, cleavable, Pa.	05
" granular, Canada	05

Fibrolite, Me.	10
Flexible Sandstone, N. C.	15
Flint, England	05
Fluorite, white, Ill.	05
" green, N. Y.	05
Fowlerite, N. J.	25
Franklinite, N. J.	10
Freibergite, Colo.	1 50
Gadolinite, Texas	1 25
Galenite, Mo.	05
Garnet, N. J.	05
" Ga., extra	15
" Almandite, Colo.	50
Garnierite, Oregon	50
Gibbsite, Mass.	15
Göthite, Colo.	30
" Mich.	30
Graphite, Ceylon, extra	15
Gypsum, N. B.	05
Halite, La.	05
Hematite, N. Y.	05
" England	35
Hexagonite, N. Y.	75
Hornblende, Conn.	05
Hyd. Anthophyllite, Pa.	10
Iceland Spar, Texas	35
Idocrase, Me.	15
Iridosmine, Cala., per oz.	6 00
Iron, Meteoric, Mexico	3 00
Jasper, N. M.	05
Kaolinite, N. J.	05
Keilhauite, Norway	1 50
Labradorite, N. Y.	25
LapisLazuli, Chili	1 50
Lepidolite, Me.	15
Lepidomelane (in rock), Me.	10
Leucopyrite (in rock), N. Y.	15
Limonite, Pa.	05
Lithiophilite, Conn.	1 00
Lodestone, Ark.	25
Magnesite, Greece	10
Magnetite,	05
Malachite, Ariz., extra	50
Marble, Italy	05
Marcasite, N. J.	10
Margarite, Mass.	35
Margarodite, Conn.	25
Martite, L. Sup.	25
Melaconite, Ariz. and L. S.	50
Menaccanite, N.C.	05
Meteoric Iron, Mexico	3 00
Mica, Pa.	05
" curved, Me.	20
Microcline, Colo., xled	25
" Va. cleavages	15
Millerite, Pa.	2 00
Mispickel, England	20
Molybdenite, Canada	1 50
Monazite Sand, N.C. and Brazil	1 00
Muscovite, Pa.	05
Natrolite, N. J.	1 50
Nemalite, N. J.	75
Nephelite, var. Elæolite, q. v.	
Niccolite, Germany, per oz.	25
Nigrine, Ark.	25
Obsidian, Wyoming	25
Oölite, silicious, Pa.	10
Opal, in gangue, Mexico	1 50
Orpiment, Hungary	1 50
Orthoclase, extra, cleavable, Pa.	05
" granular, Canada	05
Ozocerite, Utah	50
Phlogopite, N. Y.	15
Phyllite, R. I.	10
Pitch Stone, Colo.	25
Prehnite, Mass.	30
Prochlorite,	15
Psilomelane,	10
Pyrite, Colo.	05
Pyrolusite, Germany	25
Pyromorphite, on rock, Pa.	50
" pure, Pa.	2 00
Pyroxene, Canada	05
Pyrrhotite, Pa.	15
Quartz, milky, Ariz. and Colo.	05
" rose, Me.	20
" smoky, N. C. and Colo.	10
" tabular, N. C.	10
Realgar, Borneo, pure	2 00
Rhodochrosite, Colo.	50
Rhodonite, N. J.	25
Rubellite in Lepidolite, Me.	50
Rutile, Ark.	25
Samarskite, N. C.	1 00
Scapolite, Canada	05
" pink, Mass.	20
Selenite, N. Y.	10
Serpentine, Chrysotile, Quebec	25
" Williamsite, Pa.	10
Siderite, Conn.	05
Smaltite, Saxony	1 50
Sodalite (on rock), Me.	50
Sperrylite, Canada, per gram	3 00
Sphalerite, gray, massive, Pa.	20
" extra, cleavable, Mo.	10
Sphene, Canada	15
Spodumene, Me.	15
Stannite, England	1 25
Steatite, Pa. and N.C.	05
Stibnite, Hungary	25
Strontianite, Westphalia	30
Sulphur, Spain	25
Talc, N. C.	05
Tennantite, England	2 50
Tetrahedrite, Colo.	1 50
Thorite, Norway, per oz.	1 00
Thulite, Norway	1 00
Titanite, Canada	15
Topaz, Maine	20
Tourmaline, black, Me.	05
" brown, N. Y.	15
" Rubellite (in Lepidolite), Me.	50
Tremolite, N. Y.	10
Triphlylite, var. Lithiophilite, Conn.	1 00
Triplite, Me.	20

Troostite, N. J.	15	Williamsite, Pa.	10
Ulexite, Nevada	75	Witherite, England	15
Vanadinite, Ariz., pure, per oz.	50	Wolframite, England	35
" (on rock), Ariz.	2 00	Wollastonite, N. Y.	15
" and Descloizite, partly powdered	50	Wulfenite, red, Arizona,	1 50
Variscite (on rock), Ark.	30	" yellow, N. M.	1 50
Vesuvianite, Me.	15	Zincite (in Calcite), N. J.	20
Vivianite, N. J.	15	" pure, N. J.	50
Warwickite (in rock), N. Y.	50	Zircon, pure, Canada	75
Wavellite, (some rock), Ark.	20	" " N. C.	50
Wernerite, Canada	05	" in rock, Colo.	20
" pink, Mass.	20	Zoisite, gray, Mass.	25
Willemite, var. Troostite, N. J.	15	" Thulite, Norway	1 00
		Zunyite, in rock, Colo.	50

Loose Crystals.

The following is a partial list of loose crystals which we now have in stock.

Amazon Stone	$0 05 to $1 00	Hanksite	25 to 5 00
Amethyst	10 to 1 00	Hematite	25 to 1 00
Apatite	10 to 1 00	Lazulite	05 to 50
Argentite	1 00	Lepidolite	05 to 25
Azurite	25 to 2 50	Leucite	10 to 1 00
Barite	10 to 2 50	Magnetite	05 to 25
Bertrandite	25 to 2 50	Malacon	10 to 50
Beryl	10 to 2 00	Microlite	1 00 to 6 00
Beryllonite	1 00 to 4 00	Molybdenite	10 to 50
Boracite	10 to 1 00	Orthoclase	05 to 2 50
Borax	10 to 50	Perofskite	05 to 1 00
Brookite	05 to 2 50	Phenacite	10 to 5 00
Calcite	05 to 2 00	Polybasite	10 to 50
" twins	1 00 to 10 00	Proustite	50 to 5 00
Cassiterite	10 to 50	Pyrargyrite	50 to 3 50
Celestite	10 to 1 00	Pyrite	05 to 2 50
Cerussite	10 to 1 00	Pyroxene	05 to 1 00
Chalcocite	50 to 1 50	Quartz	05 to 5 00
Chalcopyrite	05 to 50	Rutile	05 to 2 50
Chiastolite	10 to 1 00	Staurolite	05 to 25
Cobaltite	10 to 1 00	Stephanite	50 to 3 50
Colemanite	25 to 1 00	Sulphur	50 to 1 50
Columbite	50 to 1 00	Thenardite	10 to 50
Corundum	10 to 2 50	Thorite	50 to 3 50
Cuprite	10 to 1 00	Thorogummite	1 00 to 5 00
Diamond	1 00 to 5 00	Titanite	05 to 2 00
Diopside	10 to 50	Topaz	05 to 10 00
Epidote	10 to 1 50	Tourmaline	05 to 10 00
Eudialyte	50 to 2 50	Vanadinite	05 to 50
Fergusonite	50 to 5 00	Vesuvianite	10 to 1 00
Fluorite	10 to 1 00	Wernerite	05 to 50
Galenite	05 to 50	Willemite	25 to 1 00
Garnet	05 to 2 50	Witherite	25 to 1 00
Glauberite	10 to 50	Wolframite	50 to 2 00
Gypsum	05 to 50	Wulfenite	10 to 1 50
Halite	10 to 1 00	Zircon	05 to 2 50

Microscopic Mounts of Minerals.

The microscope is almost indispensable to scientific mineralogists, not merely because of the much greater perfection and brilliancy of small crystals and their commonly more highly modified forms, but because the inclusions in minerals, their optical properties, etc., may be examined more exhaustively. The wonderful beauty of many mineral species when examined under the microscope is surprising to all who have never examined them in this manner. The difficulty of securing strictly first-class material, and the labor of mounting, have been overcome by us through an arrangement which we have completed with a distinguished microscopist, who has devoted his spare time for the past eight years almost exclusively to microscopic mineralogy. Our stock is most carefully examined by him, and all the best material for microscopic mounts is selected out, and again culled over under his microscope. Every mount in our stock is thus prepared by an expert. and is examined under his microscope before being offered for sale. Abandoning the old methods of cutting down specimens to such small size as to mount them in cells, we have adopted the far more satisfactory method of mounting in boxes. A specimen even as large as an inch by three-fourths can, by this method, be mounted as an opaque object, and examined exactly as it is found in nature. By far the best results are ordinarily obtained by the use of a one-and-a-half-inch objective and an "A" eye-piece. An inch or eight-tenths objective will also be found useful, but a higher power lens will but rarely be needed. A parabolic reflector is an almost indispensable attachment for lighting up deep cavities, while the bull's-eye condenser is always needed at night. We cordially recommend to our patrons the microscopes and attachments of J. Zentmayer, of Philadelphia, as being in every way equal to, if not better than, the best American or European makes. Mr. Zentmayer's catalogue will be forwarded by us to parties desiring it, and orders sent to us will have prompt attention.

The following is a list of the species we have mounted at the present time. Additions are rapidly being made, so that customers desiring species not in this list are requested to communicate with us. The universal commendation which our mounts have received, and the rapidly increasing demand for them, are the best recommendations that we could present. Our price is only twenty-five cents per mount. A few rare species, such as Cacoxenite, Childrenite, Erythrite, Eulytite, Herrengrundite, and Lettsomite, can be supplied at 50c. to $1.00 each.

Adamite.
Amarantite.
Anglesite.
Ankerite.
Apatite.
Apophyllite.
Aragonite.
Atacamite.
Aurichalcite.
Azurite.
Bertrandite.
Blende.
Breislakite.
Brochantite.
Byssolite.
Calamine.
Calcite.
Caledonite.
Celestite.
Cerargyrite.
Cerussite.
Chalcodite.
Chalcophanite.
Chalcopyrite.
Chalcosiderite.
Chalcotrichite.
Chrysocolla.
Cinnabar.
Clinoclasite.
Colemanite.
Conichalcite.
Copper, Native.
Cuprite.
Descloizite.
Embolite.
Epidote.
Erinite.
Gahnite in Mica.
Garnet.
Gold.
Göthite.
Hematite.
Heulandite.
Hübnerite.
Hydromagnesite.
Jamesonite.
Jarosite.
Linarite.
Liroconite.
Malachite.
Marcasite.
Millerite.
Mimetite.
Mixite.
Monazite Sand.
Olivenite.
Ouvarovite.
Pharmacosiderite.
Phenacite.
Platinum Sand.
Polybasite.
Prochlorite.
Pyrite.
Pyromorphite.
Pyroxene.
Quartz—
  Ferruginous.
  Stalactitic.
  on Chrysocolla.
  on Hematite.
Realgar.
Rhodochrosite.
Rutile.
Sammetblende.
Scorodite.
Siderite.
Silver.
Smithsonite.
Sperrylite.
Spessartite.
Sphalerite.
Spinel.
Stibnite.
Stilbite.
Stilpnomelane.
Sulphur.
Sunstone.
Tennantite.
Tetrahedrite.
Torbernite.
Tyrolite.
Ulexite.
Utahite.
Vanadinite.
" in Calcite.
Variscite.
Vivianite.
Wavellite.
Wulfenite.
Zunyite.

Beryllonite,

A NEW MINERAL FROM STONEHAM, MAINE.

By Profs. E. S. Dana and H. L. Wells. *American Journal of Science*, January, 1889. (See frontispiece.)

In the October number of this journal a preliminary account was given by one of us of a new phosphate of sodium and beryllium, for which the name *Beryllonite* was proposed. We purpose now to give a more complete account of this species, the unusual interest of which has been developed by fuller study.

Locality and occurrence.—The first specimens of beryllonite were discovered near Stoneham, Maine, in 1886. . . . The Stoneham region is already well known, having afforded fine specimens of topaz, phenacite,[1] herderite and many other species of greater or less interest. . . . The early specimens, like those which have been obtained since, were found either detached in the soil or occasionally imbedded in a loosely coherent brecciated mass obviously not the original matrix. The material in which the crystals and fragments occur has evidently been derived from a granitic vein, fragments of partly kaolinized feldspar, smoky quartz crystals and other species to be mentioned being common. The exploration thus far carried on, however, has not brought to light the vein in an unaltered condition, although an apparent vein four to six feet wide of decomposed material has been found. The country rock is mica schist, which has been met with at a number of points in the course of the excavations.

The species which have been obtained from the same spot associated with the new mineral, and which probably represent its original associates in the vein are the feldspars, orthoclase and albite, smoky quartz sometimes in large crystals, mica, also columbite, cassiterite, beryl, apatite, triplite. The crystals bear evidence of having been implanted upon the rock on one side as if they had occurred in cavities rather than completely embedded. Some specimens, however, retain the impression of surrounding minerals, probably mica. A single specimen is implanted upon apatite and inclusions of apatite have been noted. The chemical agencies which have kaolinized the feldspar have also left their mark on the beryllonite the surfaces of which are often roughen d or in some cases delicately etched.

Crystalline Form.—The specimens in hand are in large part fragments of crystals, ranging from those presenting a surface of an inch or two square and weighing 40 to 50 grams down to the size of a pea. Well

1 The topaz and phenacite locality is not in Stoneham, but on Bald Face Mount, North Chatham, New Hampshire, just across the state line, six or seven miles west of the beryllonite locality.

formed crystals are rare; the largest is somewhat more than an inch across. All the specimens show a highly perfect basal cleavage (c), yielding easily smooth, lustrous surfaces. Exactly at right angles to this (measured 90° 0′ and 89° 59½′) is a second cleavage, somewhat interrupted and obtained with a little difficulty; the third pinacoidal cleavage is faintly indicated in the rectangular form of some of the broken fragments, and a fourth cleavage is sometimes distinct parallel to a prism of 60°. Twins are common in which the twinning plane is a prism also of sensibly 60°, but it is found that the twinning prism and the cleavage prism, though having nearly the same angle, are not identical. Of the two positions suggested by these facts it has seemed best to follow the usage in most similar cases and make the twinning plane the unit prism. Adopting this, the second cleavage corresponds to the macropinacoid (a), the imperfect pinacoidal cleavage is brachydiagonal (b) and the cleavage prism has the symbol 130 (i-$_3$).

The material at hand for exact measurement is very scanty. With very few exceptions the planes have lost their original lustre, and give no reflections at all. A few angles, however, could be measured, and with sufficient exactness to yield a satisfactory axial ratio. For fundamental angles the following were accepted:

001 $\wedge$ 111=47° 51½′. 001 $\wedge$ 021=47° 40½′.

Each of these is the mean of two independent angles on different crystals of equal degrees of accuracy, not involving a probable error of more than ±1′; these are:

47° 51′ and 47° 52′, also 47° 40′ and 47° 41′.

The axial ratio obtained is:

$\breve{a} : \bar{b} : \dot{c}$=0.57243 : 1 : 0.54901; also the angles 100 $\wedge$ 110=29° 47′ 17″, 001 $\wedge$ 101=43° 48′ 13″, 001 $\wedge$ 011=28° 46′ 2″.

The measured angles, the symmetry in arrangement of the planes, and the optical characters all conform to the orthorhombic system. As confirming the accuracy of these elements we have:

	Measured.	Calculated.
021 $\wedge$ 02$\bar{1}$=	84° 41′	84° 39′
023 $\wedge$ 02$\bar{3}$=	139° 46′	139° 48′
100 $\wedge$ 130=	59° 45′ Cleavage.	59° 47′

* * *

In habit the crystals vary from short prismatic to tabular, as shown in Figs. 1 to 6; the aspect changes considerably with the change in relative size of the pyramids; of these, w (121, 2-$\breve{2}$) is usually most prominent. The crystals are remarkable for the number of planes which they present. The prismatic and brachydome zones are both highly developed, and it is not uncommon to note the presence of eight or more distinct planes in

each zone on a single crystal. It is also interesting to note that eleven of the twelve prismatic planes have representatives in the brachydome series, and, furthermore, they have nearly equal angles, since the axes $\breve{a}$ and $\dot{c}$ have approximately the same length.

Some idea of the complexity of the form may be gained from Fig. 8, which is a basal projection of a single crystal, simplified by the omission of several minute but distinct planes. The prismatic faces are often narrow, and by their oscillatory combination produce vertical striations, especially on *a*; the faces of the pyramid *v* also show sometimes striations parallel to the edge *v/f*.

* * *

All the planes have very simple symbols, and furthermore they are so tied together by zones that the symbols of a large part can be determined without measurement.

* * *

Twins.—The existence of contact twins with *m* (110) as the twinning plane has already been noted. These have $a\underline{a}$=120° 25′, measured 120° 22′, also $b\underline{b}$ 59° 35′. These twins are common and lead to many interesting variations in the form. A basal projection of one twin is given in Fig. 5. Repeated twinning is not uncommon; in several cases a large crystal mass was observed having its edge formed of highly modified partial crystals in successive twinning position; some of these suggest crystals of bournonite in aspect. In a single case a part of a stellate form was noted which is idealized in Fig. 7. It was too imperfect to allow of determining the exact method of grouping, but the presence of a six-rayed star was clear. These twins are remarkable among similar pseudohexagonal forms, because the variation from the required 60° is so small.

General Physical Characters.—The cleavages already noted are: highly perfect parallel to *c*; less perfect and interrupted parallel to *a*; still less distinct parallel to *n* (130), and faintly indicated parallel to *b*. The fracture is very perfect conchoidal, yielding lustrous surfaces suggestive of glassy quartz. Hardness 5.5—6. Specific gravity=2.845. Lustre vitreous and brilliant, but on a natural basal face (*c*) sometimes pearly. Colorless to white, or slightly yellowish when not perfectly clear. Transparent.

Optical characters.—The axes of elasticity coincide in position with the crystallographic axes. The axial plane is parallel to *a*, and the acute bisectrix normal to *c*, so that a cleavage fragment shows the axes on the border of the field of the polariscope. The dispersion is small, $\rho < \upsilon$. The double refraction is negative, in other words $\mathfrak{a}$ is the bisectrix. Sections cut normal to the bisectrices gave the following for the axial angles:

	Red (Li.)	Yellow (Na.)	Green (Tl.)
2E	120° 26′	121° 1′	121° 24′
Also			
$2H_a$	72° 35′	72° 47′	73° 01′
$2H_o$	125° 13′	124° 59′	124° 30′

Also $2V_y = 67° 34'$

A prism afforded by a crystal whose edge was parallel to the axis $\breve{a}$, and whose faces were formed by the planes δ (023), gave tolerable values of two of the refractive indices; the faces, however, were not quite smooth, so that no very high degree of accuracy can be claimed for them. The results for yellow (Na.) are: $\beta = 1.5580$, and $\gamma = 1.5630$. Another prism was obtained, having the same edge, but the faces did not make quite equal angles, as was intended, with the axis $\bar{b}$, which should have bisected the prismatic edge; the values of β are, therefore, fairly good, while those of γ are somewhat too small. Another prism with an edge just parallel to the axis $\dot{c}$ gave good values of the index a.

	Red (Li.)	Yellow (Na.)	Green (Tl.)
a	1.5492	1.5520	1.5544
β	1.5550	1.5579	1.5604
γ	1.5604	1.5608	1.5636

It will be seen from these results that the refractive power of the mineral is not especially high, varying but little from that of quartz, which has $\omega = 1.5442$, $\epsilon = 1.5533$ for Na.

Etchings.—It has already been remarked that the crystalline faces are almost always dull, and in some cases show natural etching figures as the result of the action of some solvent upon them. These figures have often great regularity and beauty, and merit more detailed study than our limited time has permitted us to give them. They are most distinct on the basal plane, where they appear as nearly square depressions closely crowded together, at first sight suggesting tetragonal symmetry. Fig. 12 will give some idea of the appearance of a portion of the surface; in some cases these pittings run across the basal face in diagonal lines. A more careful examination shows that while square, or nearly so, in outline, the symmetry is rhombic. The little pits are bounded within by two surfaces in the zone *bc*, making an angle of 22° with each other, and in the zone *ac* the prominent surfaces are inclined about 11°, while occasionally other deeper faces inclined 21° are also noted. The angles can be only roughly measured, but they suggest 013 (β) and 1.0.10, 105 as probable symbols for the faces in question. The planes in the two series of domes also show at times distinct etching figures . . . but the form is less distinct, though in general acute trowel-shaped with vertex pointed upward.

. . . The *b* faces often show longitudinal figures . . . and others transverse, but their form is not distinct; this is also true to some extent of the prismatic faces. The other planes are almost always slightly roughened, but distinct figures are not often to be made out. Not infrequently the solvent action on the crystals has gone so far as to leave only rounded angles with indistinct planes.

Inclusions.—Another interesting feature of this mineral is the presence of great numbers of fluid inclusions. A superficial examination shows the common existence of a columnar structure normal to the cleavage plane. This is seen in thin sections to be due to great numbers of slender canals parallel to the vertical axis. In some cases these seem to be hollow or filled with earthy matter, but in others they appear as fluid cavities with long bubbles. These vertical canals and fluid cavities are often thickly crowded together, sometimes extending from base to base, and again starting from a sharply defined plane within the crystal parallel to the base. The forms of some of these are shown in Fig. 9 ($\times 90$). Not infrequently, instead of a long cavity, we have a line of them present, all lying in the same direction. Besides these regular cavities there are also groups of fine parallel or wavy lines inclined sharply to *c*, and giving rise to a peculiar sheen; these are probably also hollow canals.

There are, further, multitudes of other fluid cavities, often so small as to require a high power of the microscope, either crowded together on an irregular wavy surface passing through a crystal after the manner so common in smoky quartz, or again more or less regularly orientated, parallel to the vertical axis or inclined to it in lines of 45° or 30°. The last becomes a V-shaped arrangement of the minute inclusions in some restricted areas, as is shown in Fig. 10. Fig. 13 shows the usual arrangement and common forms of the cavities ($\times 90$). As a rule, these cavities, even the smallest, contain each its own bubble, and very frequently two bubbles are noted (*cf.* Fig. 11) often of nearly the same size. This fact, the disappearance of the second bubble with slight rise in temperature, and further the presence or absence of a broad dark rim to the bubble, show the nature of the liquids and gases present. In many of the cases we have water with liquid carbon dioxide, and frequently also within this carbon dioxide gas. Occasionally the bubble appears to be air in water, and more rarely the cavity is partly filled with a liquid (CO_2) which does not wet its sides. Solid inclusions, sometimes macroscopic, are also noted.

Chemical examination.—Qualitative tests showed that the mineral is slowly but completely soluble in acids; that it is an anhydrous phosphate of sodium and beryllium, containing no other acids and bases, and especially careful tests proved the absence of fluorine, aluminum, potassium and lithium. Before the blowpipe it decrepitates and fuses about 3

to a somewhat clouded glass, coloring the flame deep yellow, with a tinge of green on the lower edge.

A quantitative analysis gave the following results:

	I.	II.	III.	IV.	V.	VI.	Mean.	Ratio.	Calculated for $NaBePO_4$.
P_2O_5,	56.09	55.66	55.84	...	...	...	55.86	÷ 142=.392=1.	55.82
BeO,	...	19.87	19.85	19.81	...	...	19.84	÷25.2=.787=2.	19.81
Na_2O,	...	...	...	...	23.68	23.59	23.64	÷ 62.=.381=1.	24.37
Ign.,	...	0.07	0.09	...	...	...	0.08		...
							99.42		100.00

It is evident from this analysis that the mineral has the composition represented by the formula $Na_2O.2BeO.P_2O_5$, or $NaBePO_4$.

Method of Analysis. . . . . . .

Relations to other species.—As has been shown above, the general formula of beryllonite is analogous to that of triphylite and lithiophilite, viz.:

Beryllonite.	Triphylite—Lithiophilite
$NaBePO_4$.	$Li(Fe,Mn)PO_4$.

There does not appear, however, to be as close a relation between the forms as might be expected, although our knowledge of triphylite in this respect is scanty. . . . . A closer relation seems to exist to the only other phosphate in which beryllium is known to exist, that is herderite. This has the composition $(CaF)BePO_4$ in which the univalent group CaF (partly replaced by CaOH) corresponds to the sodium of the beryllonite. In form the two minerals are apparently related.

* * *

The optical relations do not correspond very closely except in the size of the axial angle, for which we have in herderite $2H_{a.r.}=72° 12'$ Dx. The refractive power of beryllonite is a little lower than that of herderite ($\beta=1.6$). It is certainly most interesting that these two beryllium phosphates should be found within a few miles of each other, and that the same region should have yielded the rare beryllium silicate phenacite.

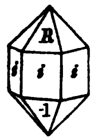
* * *

[We can supply fairly good crystals of beryllonite at $1.00 to $4.00; cleavages, 10c. to $1.00.]

Herkimer Co. Quartz Crystals.

The perfection and beauty of these crystals make them always in demand. We have several thousand crystals in stock. Extra choice specimens cost considerable (50c. to $4.00 each); but excellent crystals can be had at 5c. to 25c. Figures 23 and 24 show two of the commonest forms.

Some of the crystals show enclosures of carbon, occasionally movable; others have movable bubbles in them. Such enclosures can be supplied at 50c. to $5.00 each.



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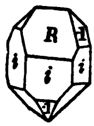


No. 24.

Franklin Minerals.

The celebrated mines in Sussex County, New Jersey, have not yielded any good specimens for nearly three years. We can supply typical specimens of average quality from our old stock at most reasonable prices.

Franklinite crystals, 25 cents to $2.50.

Troostite crystals, 25 cents to $1.50.

Rhodonite, var. *Fowlerite*, crystallized, 25 cents to $3.50.

Zincite, 10 cents to $1.50. *Calamine*, 25 cents to $3.50.

Dysluite, 25 cents to $2.50. *Chalcophanite*, 10 cents to $1.00.

Hetærolite, 10 cents to $1.00. *Sussexite*, 50 cents to $2.00.

Jeffersonite, 10 cents to $1.00. *Spinel*, 25 cents to $1.00.

Green Tourmaline, 10 cents to $1.00.

Also, Calcozincite, Polyadelphite and Melanite Garnets, Tephroite, Ruby Corundum, Yellow Willemite, Amazon Stone, Orange Calcite, Automolite Crystals, etc.

Bementite.—In June, 1887, a small pocket of a fibrous mineral, not very unlike Pyrophyllite in appearance, was found in the Trotter Mine, at Franklin. Analysis of it was made by Prof. G. A. König, who described it, October 25th, 1887, before the Academy of Natural Sciences of Philadelphia, and named it Bementite, in honor of Mr. C. S. Bement, the well-known collector. The analysis is as follows:

SiO_2	39.00
MnO	42.12
H_2O	8.44
FeO	3.75
ZnO	2.86
MgO	3.83
	100.00

We have secured every obtainable specimen of the mineral, and can supply specimens at 10 cents to $3.50 each. A new variety of Serpentine, identified by Prof. König, is generally associated with the Bementite.

Pyrite Crystals from French Creek, Pa.

By Prof. S. L. Penfield (*Amer. Jour. Science*, March, '89).

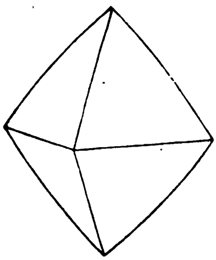
Ordinarily simple octahedrons and cubes of pyrite occur at French Creek, Pa., while occasionally rarer combinations are met with, as the cube with π (420), ½ (4–2). The crystals are bright and have a good lustre, but are usually covered with vicinal faces and are sometimes quite distorted by them. The crystals which are to be especially described in the present article, are five which are in the collection of Mr. C. S. Bement of Philadelphia, and two in the collection of Prof. Geo. J. Brush of New Haven. . . . They are in all cases isolated crystals, built out in all directions and showing no attachment. I have been unable to obtain any exact information as to their mode of occurrence, and can only state that they are very rare and are from the iron mines of French Creek.

The special peculiarity of these crystals is that they are abnormally developed, *i.e.*, lengthened out, in the direction of one of the crystallographic axes. If we take this direction as the vertical, the crystals will appear either as steep tetragonal or orthorhombic pyramids. In all cases the pyramidal faces are curved toward the apex and as a result of this the pole edges, running from the lateral to the vertical axes, are curved, while the middle edges, running between the lateral axes, are perfectly straight. Owing to this curving, the angles between the faces cannot be measured with the reflecting goniometer, and admit of only approximate measurement with the contact goniometer. The crystals have a remarkably perfect geometrical development, that is, similar faces are developed to almost exactly the same size and extent.

The first three crystals to be described, which are in the Bement collection, appear as tetragonal pyramids. By measurement of the interfacial angles over and near to the middle edges, the faces were found to be steep enough to cut the vertical axes at 1.25, 1.50 and 1.80 respectively, but owing to the curving the distances at which the faces actually intercept the vertical axes are less. Figures 25, 26, and 27 represent the three crystals, drawn with the same length of the lateral axes, and with the pole edges straight for a short distance from the lateral axes, and steep enough to cut the vertical axes at 1.25, 1.50 and 1.80, respectively, but curved toward the top so that the vertical axes are really cut at 1.16, 1.25 and 1.50 respectively, according to actual measurement of the diameters of the crystals. The crystals are of good size, and measure in the direction of the vertical axes respectively 22, 22 and 33 mm.

The remaining crystals are perhaps more interesting, owing to the occurrence of pyritohedral or pentagonal dodecahedral faces, which in all of the crystals occur only at the extremities of the lateral axes. The

faces are rough, but approximate measurements with the contact goniometer determine the crystals to be the ordinary pyrite form *e*, π (210), $\frac{1}{2}$ (*i*—2). The pyramid is in all cases the curved $\frac{3}{2}$ form, *r*, like Fig. 26.



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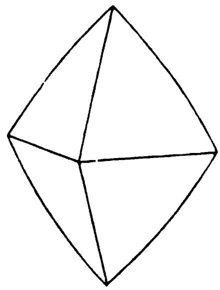

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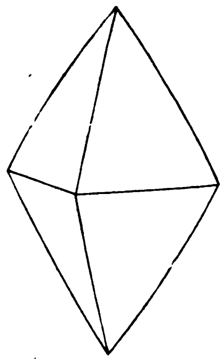
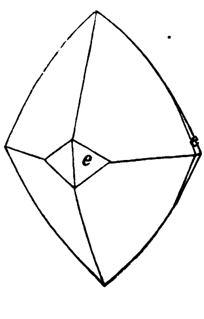
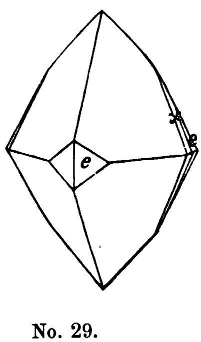


No. 27.

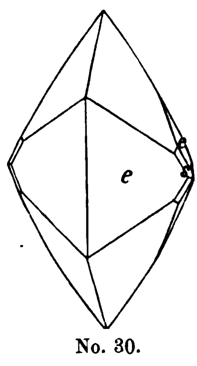
The pyramid faces are always striated near to and about the front pyritohedral faces, the striæ being a little steeper than the combination edge between *e* and *r*, and having about the direction of the combination edge π (421), $\frac{1}{2}$ (4—2) and *r*. The pyritohedral faces have very different shapes at the extremities of the two lateral axes and the crystals, having only three symmetry planes, resemble orthorhombic forms. The two crystals in the Brush Collection, which are so nearly alike that they cannot be told apart, are represented in Fig. 28. [Sold to Prof. Brush by G. L. E. & Co.] Fig.



No. 28.



No. 29.



No. 30.

29 represents a crystal in the Bement Collection where the edges between the *e* faces at the sides and *r* are replaced by a form *x* in the zone *e*, *r*. The *x* faces are all rough, and admit of only approximate measurement with the contact goniometer. The symbol was determined to be (6, 12, 7), $2-\frac{12}{7}$. There are only eight of these faces, instead of the twenty-four which we should expect in an ordinary pyrite crystal. Fig. 30 represents a

crystal in the Bement collection, in which the *e* faces are larger. This is the most unsymmetrical of all the crystals; on the side, which is turned away from the observer, the *e* faces are so large that the front and side ones just meet, forming a solid angle, and leaving none of the middle edges between the lateral axes; on the other side, which is shown in the figure, the *e* faces are still larger, and the edges between them are replaced by the small *s* faces 231, 3—$\frac{3}{2}$. The *s* faces were bright, and admitted of approximate measurement on the reflecting goniometer, giving $s \wedge s$, $231 \wedge 23\bar{1} = 30° 40'$, calculated 31° 0′. These *s* faces differ from the ordinary pyrite combination, for with 210 and 021 usually 321, 132 and 213 occur in one octant, while here only one of the alternating faces 231 occurs.

All who have seen these crystals pronounce them the most curious and interesting pyrite crystals that they have ever seen. Why they have been distorted in this peculiar way I cannot venture to say. Some law must have governed them, for they all have such perfect, though lower than isometric, symmetry. It is perhaps the result of the vicinal development of the faces which is so common at the locality. If in Fig. 31, which is the ordinary isometric trigonal-trisoctahedron 332, $\frac{3}{2}$, the four *r* faces in front, and the corresponding ones behind were extended they would give a tetragonal pyramid like Fig. 26, except that Fig. 26 has been somewhat shortened by the curved nature of the faces. The curious forms which we have been considering I prefer to regard as abnormally developed trigonal-trisoctahedrons. That they are really isometric is proved by the occurrence of the ordinary pyrite form π (210), $\frac{1}{2}$ (i—2). The behavior of one of the curved crystals on the reflecting goniometer is also quite striking. Measuring from pyramid to pyramid over the vertical axis the very points gave sharp reflections of the signal, and then on turning the crystal there followed an unbroken band of light, with no sharp reflection of the signal, as long as different parts of the curved surfaces were in a position to reflect the light. The angle between the sharp reflections of the signal, obtained from the very minute flat surfaces at the points, was found to be 109° 36′, calculated for $o \wedge o$ ($111 \wedge \bar{1}\bar{1}1$) 109° 28′. We see from this that our steep $\frac{3}{2}$ pyramid at the base, becomes by the curving gradually flatter till it corresponds to a unit pyramid or octahedron at the vertex.

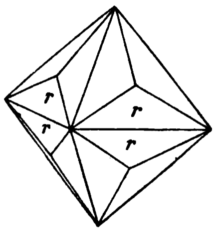
The specific gravity of two of the crystals, represented in Figs. 26 and 28, was found to be 5.016 and 5.022 respectively.

MINERALOGICAL LABORATORY, SHEFFIELD SCIENTIFIC SCHOOL,
December 18th, 1888.

Additional Note.—Very recently Mr. George L. English of Philadelphia sent me a suite of French Creek pyrites . . . containing six of the elongated pyramids, mostly of the Fig. 28 type, also a number of cube octahedron and pyritohedron combinations which are modified and

rounded by the occurrence of vicinal faces and one crystal, forming a sort of connecting link between an octahedron and the Fig. 26 type, where the octahedron and some trigonal trisoctahedral faces round off and blunt the apex of the pyramid. He also informs me that the isolated crystals occur imbedded in calcite. S. L. P.

Several other interesting forms, beside the above described, occur at the French Creek mines. One of these is shown in Fig. 32. The demand



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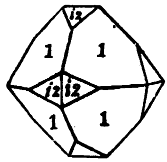


No. 32.

for all these modified octahedrons is far greater than the supply. It is only occasionally that we are able to secure one or two of them. If our customers will kindly file their orders with us we will endeavor to supply them. Prices $1.00 to $7.50. Bright, regular octahedrons, 5c. to $2.50.

French Creek Chalcopyrite.

The crystallized chalcopyrite of the French Creek Mines, in Chester Co., Pa., has long been well known to collectors of fine minerals. The crystals are mostly on a base of the same mineral, more or less mixed with pyrite, magnetite and amphibole. The crystals occur completely imbedded in a calcite, rendered green by the multitude of crystals of byssolite embedded in it. This is dissolved off with acid, leaving the crystals of the copper pyrites in beautiful groups, having a very rich and varying iridescence, blue and copper-red colors predominating. We have bought all the specimens obtainable direct from the mines, and our prices have always been low, 50c. to $2.50 for large drawer specimens, $2.50 to $7.50 for shelf and museum specimens. Recently some remarkably sharp, detached crystals of interesting forms have been sent us. A paper on these crystals by Professor Penfield will shortly appear in the *American Journal of Science.* Prices 5c. to 50c. each.

Rutile, N. C.

The rutile crystals from Alexander Co., North Carolina, of which we have a large stock, are worthy of especial notice. They have a brilliant sub-metallic lustre, and a very high polish. The color is ordinarily iron-

black, but generally a rich ruby-red by transmitted light. Several planes new to the species have been described (see *A. J. S.*, June, '87), and the complex modifications common to the crystals from this locality give them unusual interest. The average size of the crystals is about $\frac{3}{16}$ inch thick by one inch long. Choice specimens will be furnished at 10c. to 50c. each.

Arkansas Minerals.

Mr. Niven has visited the well-known Arkansas localities three times, and we also sent our collector there last September. We have, therefore, a splendid stock of *all* the desirable minerals from this region.

Quartz Crystals, extra good, 10 cents to $5.00.

Ægirite, splendid, terminated crystals, some of them as much as ten or twelve inches long, 25 cents to $10.00

Wavellite, excellently crystallized, 10 cents to $2.50.

Variscite, choice, 10 cents to $1.00.

Rutile, geniculated, extra good, 10 cents to $2.50.

Rutile paramorphs after Brookite, very fine, 25 cents to $5.00.

Brookite, brilliant crystals, loose and on the gangue, the finest ever in the market, 10 cents to $10.00.

Perofskite, choice crystals, 10 cents to $2.00.

Eudialyte was first recognized a number of years ago by Sheppard, and since then has been lost sight of until Mr. Niven visited the locality. It occurs of a very beautiful pink color, and occasionally in good crystals. Specimens, 25 cents to $5.00.

Lodestone, very strong, 10 cents to $1.00.

Elaeolite, 5 cents to 50 cents.

Yttria and Thoria Minerals from Texas.

An elaborate paper, by W. E. Hidden and J. B. Mackintosh, on the rare minerals recently discovered in Llano Co., Texas, appeared in the *American Journal of Science*, December, 1889.

Yttrialite is a new thorium-yttrium silicate, occurring only massive, of a dark olive-green color. Specimens, 25 cents to $5.00.

Thoro-Gummite is a new hydrated uranium thoro-silicate, of a dull yellowish-brown, generally massive, though a few groups of zircon-shaped crystals were found. But one kilo of this species has been secured. Specimens, 50 cents to $5.00.

Nivenite is a new hydrated thorium-yttrium-lead uranate. Only a very small quantity has been found, it occurring massive, of a velvet-black color. One cubical crystal has been found. Specimens, 50 cents to $5.00.

Fergusonite, in two distinct varieties, designated "mono-hydrated," and "tri-hydrated," have been described. Good crystals, $1.00 to $5.00; massive specimens 25 cents to $2.00.

Gadolinite has been found in large quantities in Texas, and some

crystals of enormous size (up to sixty pounds) were found. The material is almost invariably superficially altered into a reddish-brown mineral. Specimens, 25 cents to $5.00. Museum specimens, $10.00 to $25.00.

Allanite, of a beautiful, shining, pitchy-black appearance, occurs rather sparingly in masses. This is an exceptionally attractive variety. Specimens, 25 cents to $1.00.

Cyrtolite has been found abundantly, both massive and in good crystals. Specimens, 25 cents to $3.50.

Tengerite, the very rare carbonate of yttrium, occurs sparingly in the cracks and fissures of the Gadolinite and Yttrialite. Specimens, 50 cents to $2.50.

Gummite is also associated with the other rare minerals of this interesting region. Specimens, 50 cents to $2.50.

Other associated minerals are Molybdenite, Molybdite, Fluorite, Smoky Quartz Crystals, Hyalite, Orthoclase in good crystals, Albite Biotite (?), Muscovite, Magnetite, and Martite.

As Mr. English visited these Texas localities in February, 1889, and as Mr. Niven has made three visits and devoted some two months' time to developing them, we have a large stock of specimens.

A pamphlet giving the full paper of Hidden and Mackintosh will be sent *free* to all customers who wish it.

Mexican Minerals.

Mr. Niven visited Mexico during the summer of 1889, and he will devote the coming summer to another and much more extensive visit to these excellent localities, and we are anticipating great results from his trip.

Topaz crystals from San Luis Potosi were secured in large numbers and of great brilliancy and beauty. The crystals are generally small, averaging about half an inch in length, but some which Mr. Niven secured were as much as 1½ inches long by ⅝ inch in diameter, and of a delicate light wine-yellow color. We have a very large and fine stock, both of loose crystals and gangue specimens, at 10 cents to $10.00.

Calcite and *Amethyst* from Guanajuato, are very richly represented in our stock, 10 cents to $3.50 being average prices.

Apophyllite from Guanajuato, in magnificent specimens, has been so popular that no specimens remain. We hope to secure a fine lot ere long.

Opals, of all kinds, 10 cents to $5.00.

Native Iron Sulphates from Chili.

We have a good stock of the rare minerals *Amarantite, Roemerite, Copiapite*, and *Coquimbite*.

Amarantite, a recently described species, occurs in microscopic crystals of a rich orange-red color associated with Copiapite. The analysis by Frenzel gave SO_3, 37.26; Fe_2O_3, 35.58; H_2O, 27.62 = 100.46, leading to the formula $Fe_2O_3, 2SO_3 + 7H_2O$. Specimens 25 cents to $2.00.

Roemerite occurs mostly massive or crystalline, of a dark brown color. Specimens, 25 cents to $1.50.

Copiapite is massive and of a light yellow color. Specimens, 10 cents to $1.00.

Coquimbite occurs well crystallized, but usually massive, of an amethystine color. Specimens, 25 cents to $2.00.

Native Copper Pseudomorphs after Azurite.

Prof. Wm. S. Yeates, in the *American Journal of Science,* November, 1889, describes this most curious occurrence of copper from near Georgetown, New Mexico, popularly known as "copper balls." These aggregates are found imbedded in kaolin. Upon removing this with a knife or a sharp pointed instrument, the bright surface of the copper is revealed. Those who are familiar with the balls of Azurite crystals from Chessy, France, or Morenci, Arizona, would be at once struck with the similarity of these copper formations. The specific gravity of the copper is very low (4.15), and it is very brittle. "An examination of the fresh fracture with a lens showed that the kaolin not only coated the surface, but that it was intimately mixed with the copper-like particles, producing a granular fracture, and giving rise to the stippling on the crystal surfaces. A fragment under the pestle in an agate mortar was reduced to powder, the metallic grains, which had been proved before the blowpipe to be copper, segregating together, and marking the mortar and pestle with bright, shining streaks. The copper being so finely divided, it was now clear why the specimen was brittle and why it had so low specific gravity. If the copper was, as it appeared to be, a pseudomorph after azurite, the latter must have lost its carbonic acid and water in the presence of some reducing agent, probably volcanic gases thrown up from below, leaving the copper in a spongy state, upon which the kaolin was deposited, and forced by pressure while in a soft, semi-liquid condition into the pores of the sponge."

We have a large stock of these most interesting pseudomorphs. Prices, 50 cents to $2.50, with the kaolin well cleared off, or 25 cents to $1.50 for the "balls" covered with kaolin.

Descloizite from Georgetown, New Mexico.

Descloizite occurs in all of the fifteen mines on Parapet Mountain, Grant County, New Mexico. In June 1887, Dr. F. A. Genth announced the occurrence of a vanadate of lead in the McGregor Mine, one of the group now owned by the Mimbres Consolidated Mining Co. Dr. W. F.

Hillebrand (*American Journal Science*, June, 1889) describes the occurrence of descloizite in the Commercial Mine, Georgetown, and gives the following analysis:

PbO	56.01
CuO	1.05
FeO	0.07
ZnO	17.73
V_2O_5	20.44
As_2O_5	0.94
P_2O_5	0.26
H_2O	2.45
Cl	0.04
SiO_2	1.01
CaO	0.04
MgO	0.03
	100.07

Dr. Hillebrand says, "This is one of the most interesting occurrences of descloizite known, because of the extreme brilliancy of coloring of the mineral. . . . In places where the rock is most fractured and crushed the descloizite appears in greatest quantity and finest condition as an incrustation on quartz, often covering large surfaces, and in color varying from yellow through all shades of orange-red to deep reddish brown, the last-named colors predominating. The black color so frequent in descloizite from Lake Valley, New Mexico, caused by a superficial coating or admixture of pyrolusite, is, so far as my observation extended, wanting, hence specimens from Georgetown are likely to be much sought after for their showy appearance."

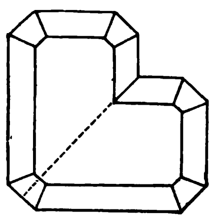
Since the above was written many specimens incomparably finer than those which furnished the basis of the above description have reached us direct from the mines, as the result of Mr. English's visit in April, 1889. The crystals are commonly closely aggregated in globular forms, and on many specimens they are clearly pseudomorphs after vanadinite, retaining the hexagonal form, while in others they appear to be stalactitic. In the latter form the crystals attain their largest size, occasionally measuring as much as one-eighth of an inch. Very rarely, isolated crystals of small size may be found scattered over the rock. They appear to be very simple tabular rhombs. The brilliant polish of the crystals, and the rich, gorgeous colors give to the specimens a sparkle and beauty never before seen in this rare species.

Bright little rhombs of calcite are frequently scattered over the descloizite; wulfenite in small orange-yellow crystals is occasionally to be

seen, especially on such specimens as contain cerussite and embolite, which last-named mineral is the chief silver ore of the mines and occurs in very rich and sharply crystallized specimens. The most common associate of the descloizite, however, is vanadinite. It occurs in regular hexagonal prisms, but more commonly in curved or barrel-shaped crystals similar to those of the Big Bug district in Yavapai County, Arizona. Some of these crystals also show a curious hollowing out. The superficial colors of the vanadinite are almost always either white, gray, or brown; but by transmitted light all of the specimens have a clear honey-yellow color. Crystalline sheets, showing on one side distinctly crystallized vanadinite, and on the other descloizite, are among the other interesting novelties of this locality. The enthusiastic reception which has been given these minerals warrants us in commending them to our customers. We can supply *extra fine* specimens, averaging 1x1 inches, for 10 to 25 cents; 2x3 inches, 50 cents to $2.50; 3x4 inches, $1.00 to $3.50. Shelf and museum specimens, $3.50 to $15.00.

Red Wulfenite from Arizona

Was first noticed in 1881, by B. Silliman,[1] and since described by Koch,[2] and later by W. B. Smith.[3] From the Red Cloud Mine by far the finest specimens known have been taken. "They show very solid tabular crystals of large size, brilliant lustre, and rich orange-yellow to orange-red color. The color at once suggests the presence of vanadic acid, like the well-known specimens from Wheatley Mines, as detected by Smith, but I have not found a trace of vanadic acid in these Red Cloud or other Arizona wulfenites."—*Silliman.*



No. 33.

The accompanying figure represents one of the twin crystals described by W. B. Smith. "They are composed of two rectangular tablets united by the prism ∞P, and produce a form bent at an angle of 90°, as shown in Fig. 33. Pyramids of the second order predominate, those of the first order are subordinate, and the base, OP, is rare. Koch did not find it on specimens he examined, but instead a very low pyramid of the second order, very common on crystals of this lot, which he refers to $\frac{1}{264}P\infty$." We have had large numbers of superb specimens of the Red Cloud wulfenites in stock as the result of Mr. English's visit to the mine. Loose crystals, 10 cents to $2.00; choice gangue specimens, 25 cents to $10.00.

In the Melissa Mine, about a mile from the Red Cloud Mine, occur fine red wulfenites, generally, however, smaller and of a lighter orange

[1] *Amer. Jour. Sc.*, III., Vol. XXII., Sept., 1881.
[2] *Zeitschrift für Kryst. und Min.*, VI., 1882, p. 397.
Proc. Colo. Sc. Soc., Vol. II., p. 162, 1887.

color than those of the Red Cloud Mine. We secured quite a large number of very interesting crystals, with basal plane very much reduced, and in some cases entirely wanting, giving the crystals an octahedral habit. These rare crystals commonly measure about one-fourth of an inch in each direction.

Specimens from the Melissa Mine, 25 cents to $2.00.

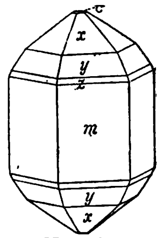
Vanadinite in Arizona.

The first mention of the occurrence of Vanadinite in Arizona was made by B. Silliman, in the *American Journal of Science*, September, 1881. He described the occurrence of the mineral in several of the mines in the "Silver District," and also in the "Vulture District," in the latter of which Crocoite, Vauquelinite, Phœnicochroite, Jossaite (?), Volborthite (?), Descloizite, Chileite (?), Mimetite, and Wulfenite are also found. Subsequent papers on Arizona Vanadinite have appeared as follows: W. P. Blake (*A. J. S.*, Nov., '81), on the occurrence in the Castle Dome District, Arizona; F. H. Blake (*A. J. S.*, Aug., '84), on the occurrence in Pinal County, Arizona; S. L. Penfield (*A. J. S.*, Dec. '86), on the occurrence in Pinal County, Arizona and Lake Valley, New Mexico (Endlichite); W. B. Smith (Proc. Colo. Sc. Soc., April,' 87,) on the occurrence in Yuma County, Arizona.

The specimens from the Hamburg and other neighboring mines in the Silver District, Yuma County, are unquestionably the most beautiful Vanadinites in the world. Mr. English visited this district in May, 1889, and secured by far the largest and most varied lot of specimens ever shipped from Yuma County. The whole district is now deserted, none of the mines having proved profitable, and it, therefore, seems probable that no additional specimens will come into the market, unless the mining be carried on solely for the Vanadinite, which would be so expensive as to compel a very material increase in the price. Our prices for choice specimens of this beautiful mineral will be found remarkably low.—The Yuma County crystals occur of various rich shades of yellow, orange, and red; the most common form is the hexagonal prism, with one or two planes beveling each terminal edge, and occasionally with planes replacing the terminal angles, though at times very much more highly modified crystals are noted. The crystals are ordinarily implanted singly on a siliceous, or, more rarely, a cleavable calcite rock. Occasionally doubly-terminated crystals are laterally attached to small quartz crystals, forming very attractive specimens for the microscope.

The Vanadinite from Pinal County, most admirably described by Prof. Penfield, is less beautiful than that of Yuma County. Mr. English took a trip in a wagon to the mines of the "White Picacho District" (Silliman's "Vulture District") in April, 1889, in company with their

owner, the road leading for some sixty miles over an uninhabited desert, with no water for thirty miles. The material secured was scanty, sufficient, however, to enable us to supply our customers with average specimens. The Vanadinite of this district varies greatly in color, form, and occurrence. The Phœnix Mine yields mostly short, stout prisms, similar in the main to Fig. 34, and of a dark orange or red color. In the Collateral Mine the mineral is much less regular in form, though generally quite acicular, and of a light yellow color, sometimes enclosed in a clear calcite.



No. 34.

As already noted, our stock of Vanadinite is very large. *Choice* specimens an inch square can be purchased as low as 10 cents. Average sizes, 25 cents to $2.00. Larger, $2.50 to $25.00.

Other Arizona Minerals.

Azurite, Arizona.—The finest azurites from any locality in the world (not even excepting Chessy) have been recently secured from the celebrated Copper Queen Mine at Bisbee. Both in size, perfection and brilliancy, they are unsurpassed. As we have personally visited the locality, and as one of our own collectors is constantly on the alert for the best Arizona minerals, we have been able to secure a few of the most remarkable crystals, and large numbers of exceedingly beautiful groups of smaller crystals The finest crystals brought $10.00, but as our prices for Arizona specimens are very much lower than those asked for the Chessy specimens, our customers will find Arizona groups at $2.50 as good as $10.00 Chessy specimens. Choice crystallized azurite specimens 10 cents to $10.00. A lot of very fine pseudomorphs and partial pseudomorphs of malachite after azurite were secured recently from Morenci, prices 50 cents to $5.00; also a few complete balls of azurite crystals, 25 cents to $1.50.

Malachite, Arizona.—At Bisbee we secured a lot of superb velvet malachites, and light masses composed of aggregations of rich glossy tufts of crystals, the most beautiful we have ever seen. A few specimens still remain at 25 cents to $2.00; museum specimens $5.00 to $10.00. We have also a good stock of the stalactitic malachite and azurite from Morenci, polished to show the beautiful banding of green and blue, 25 cents to $2.50.

Chrysocolla, Arizona.—From Morenci, Bisbee, Globe and other places in Arizona, we have good specimens of Chrysocolla. The Bisbee specimens are made up of layers of botryoidal masses of a very light blue color and have been quite popular. 10 cents to $1.50.

Cuprite, Arizona.—Bisbee has so far produced the finest groups of large cuprite crystals of any American locality, a few of them being fully as good as the best Cornish specimens, though the average specimens

(10 cents to $1.00) are scarcely so good. Several localities for chalcotrichite have been noted in our collecting tours, but so little has been secured that none is at present in stock. One mine at Morenci has produced a few incomparably fine specimens. As we are constantly securing new lots of minerals from Arizona, it is quite possible that we may be able to supply our customers with such specimens, and we, therefore, recommend them to file their orders with us.

For Lettsomite from Arizona, see page 43.

Japanese Topaz and Orthoclase.

Topaz.—Quite a large number of fine crystals of Topaz have been imported by us, two shipments having been received direct from Japan. The crystals vary greatly in form, the last shipment containing a large number of colorless, prismatic crystals, averaging about ½ inch in length by ⅛ inch in diameter, and many of them with highly modified terminations. Crystals strongly resembling the magnificent specimens from the Adun-Tschillon Mountains, Siberia, and measuring as much as 2½ inches, have been received by us. Many of these large crystals are unfortunately water-worn. Their colors vary from a pale aquamarine blue through light green shades to the perfectly colorless. Three or four of the largest crystals show a very pale pink color near the edge, and a blue centre. The finest crystals average about half an inch to an inch and a half in size, are colorless, transparent, and have highly modified terminations. Two of the terminal planes are sometimes curiously etched and serrated, while two or occasionally four similar planes are roughened. We have a fine stock of these new and interesting crystals. Prices of good crystals 25 cents to $10.00. Cleavages, 5 cents to 25 cents.

Orthoclase.—We would call especial attention to the superior excellence of the crystals of orthoclase from Japan. They are sharply defined and present not only single crystals but excellent twins of both the Baveno and Carlsbad types. The crystals vary in size from an inch to four inches, averaging about 2 in. Our prices range from 10 cents to $2.00.

Alaska Garnets.

The beautiful red Almandite garnets from Alaska (represented in Fig. 35) are always popular. They occur in truncated rhombic dodecahedrons imbedded in a hard mica schist. We have a large and choice stock. Loose crystals, 10 cents to $1.00; gangue specimens, 10 cents to $5.00.

Ulexite from Nevada.

We have in stock exceedingly choice specimens of this rare mineral, showing the long silky fibres so characteristic of the species. Prices, 25 cents to $1.50. Analysis by J. E. Whitfield of the United States

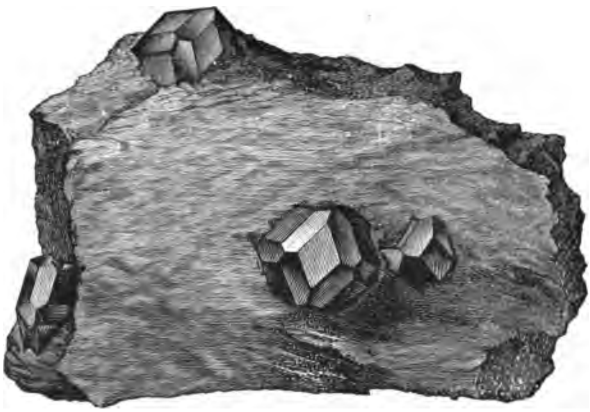


Fig. 35.

ALMANDITE GARNETS

IN MICA SCHIST,

NEAR FORT WRANGLE, ALASKA.

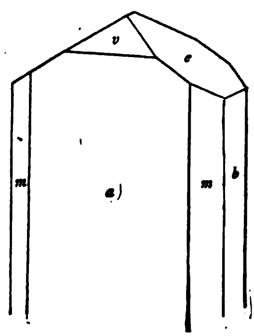
Geological Survey, of material from the same locality (*American Journal Science*, October, 1887), is as follows:

		Calculated Composition.
SiO_2	0.04	
Cl	2.38	
B_2O_3	43.20	45.34
SO_3	0.28	
CaO	14.52	15.04
Na_2O	10.20	8.83
K_2O	0.44	
H_2O	29.46	30.79
	100.52	100.00
Deduct O for Cl	.53	
	99.99	

Copper Arsenates, etc., from Utah.

The occurrence of a number of the rare copper arsenates in the Tintic District, Utah, was first announced by Mr. Richard Pearce to the Colorado Scientific Society, in April, 1884. Considerable work has since been done on the group by Mr. Pearce, Dr. W. F. Hillebrand and H. S. Washington, the results of which have been published in the *Proc. Colo. Sc. Soc.* and *Bulletin No. 20, U. S. Geological Survey.* The group is one possessing many most interesting features, especially in the chemical relations of the species. As a rule the crystals are small, and, therefore, superb microscopic mounts of many of the species below enumerated have been secured. [See List of Microscopic Mounts on p 17.]

Olivenite occurs in good crystals of olive-green and brownish-yellow colors. Acicular crystals are by far the most common, and generally their form is very simple, even the planes *b* (*010, i-ĭ*), and *v* (*101,i-ī*), in Fig. 36, being, as a rule, absent or at least quite minute. The much rarer tabular form of Olivenite occurs very sparingly in the Tintic District. A third compact fibrous variety corresponds to the "wood-copper" of the Cornish miners. [Specimens of Olivenite, 25 cents to $1.50.]



No. 36.

Erinite is one of the rarest of the group in the Tintic District. In the published descriptions it is mentioned as a "dark-green crystalline lining of cavities." We have since secured the species in quite distinct crystals, and it is probable that ere long erinite may be accorded a place among the other crystallized species of the group. As a rule the mineral shows a rich

atiny sheen, due to reflection from exceedingly minute crystal facets. This characteristic, and its ordinarily darker color, generally serve to distinguish it from conichalcite, which it often much resembles. Stalactitic forms are quite common, and also pseudomorphs after Olivenite and Azurite. Analyses of the Utah Erinite are as follows:

	I.	II.	III.	
	Hillebrand.		Pearce.	
			a	b
CuO	57.67	57.51	56.56	57.43
ZnO	1.06	0.59	. .	. .
CaO	0.32	0.51	0.43	. .
MgO	tr.	tr.	. .	. .
As_2O_5	33.53	31.91	32.07	32.54
P_2O_5	0.10	. .	. .	. .
H_2O	7.22	9.15	6.86	7.67
Fe_2O_3	0.14	0.20	0.85	. .
SO_3	. .	. .	tr.	. .
	100.04	99.87	96.77	97.64

[Specimens of Erinite, 25 cents to $2.00.]

Conichalcite occurs in the form of beautiful emerald-green spheres, averaging three-fourths of a millimeter in diameter, and showing when broken a radiated structure. Very commonly these little globules are closely aggregated, sometimes completely covering large surfaces of the rock. Like erinite, conichalcite is also found in stalactites and pseudomorphs. Analysis by Hillebrand shows: CuO, 28.68; CaO, 19.79; MgO, 0.54; ZnO, 2.86; Ag, 0.30; As_2O_5, 39.94; P_2O_5, 0.14; H_2O, 5.52; Fe_2O_3, 0.36; CO_2 (by difference), 0.97; Quartz, 0.90 = 100.00.

"Heated in any manner before the blowpipe, most violent decrepitation ensues, the entire fragment flying into fine powder. In a closed tube, after decrepitation has ceased, the particles, by gently tapping, may be made to collect at the bottom as a brown-black spongy mass of great volume. This collected on a loop of platinum wire fuses before the blowpipe, at first with a pale-bluish coloration of the flame."

[It is a beautiful mineral under the microscope, and we commend our mounts of it most confidently. Cabinet Specimens, 25 cents to $2.00.]

Tyrolite is the most abundant of the Utah copper arsenates, but crystallized specimens of it are *exceedingly* scarce. It ordinarily occurs as a thin, foliaceous coating of a more or less radiated structure, on a hard quartz rock. It has a bright green color, sometimes of a bluish cast, and its lustre is pearly. The identity of the Utah mineral with Tyrolite is not yet fully established, a query being placed after the name in the published description. If we mistake not, however, no crystallized specimens had been found when it was described, and it is probable that examination of

the pure crystals which we collected in June, '89, will lead to positive results. The analyses are as follows:

	I. a	I. b	I. Hillebrand. Mean.	II.	III. Pearce.
CuO	45.20	45.23	45.22	46.38	42.60
ZnO	. .	0.04	0.04	tr.	0.97 (Fe_2O_3, Al_2O_3)
CaO	6.86	6.82	6.84	6.69	9.10
MgO	0.05	. .	0.05	0.04	. .
As_2O_5	28.84	28.73	28.78	26.22	27.87
P_2O_5	tr.	. .	tr.	tr.	. .
H_2O	17.26	. .	17.26	17.57	16.23
SO_3	?	?	?	2.27	2.45
	98.21		98.19	99.17	99.22

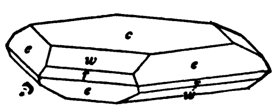
Assuming that SO_3 was present as gypsum, the following molecular ratios are obtained:

	CuO (CaO)		As_2O_5		H_2O
I.	5.00	:	0.94	:	6.80
II.	5.00	:	0.84	:	6.81
III.	5.00	:	0.90	:	6.29

The As_2O_5 is somewhat less, and the H_2O much too low to satisfy Von Kobell's formula for tyrolite, viz., 5CuO, As_2O_5, $9H_2O$. A large portion of the water in tyrolite is so loosely combined that Church considers its correct formula as 5CuO, As_2O_5, $4H_2O$, he claiming that much of the water shown by the analyses is hygroscopic water included between the plates of the mineral. Hillebrand states that but *three* molecules of water are *firmly* combined in the Utah mineral. It is quite possible that future work may entirely change the theoretical composition of the European tyrolite, and separate the Utah mineral as a distinct species.

Specimens, 25 cents to $2.00.

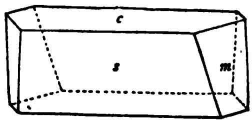
Chalcophyllite is by far the rarest of the Utah arsenates, for though Mr. English has visited the localities three times, but two inferior specimens were secured by him. While no analyses of this species have been made for want of sufficient material, the accompanying figure (No. 37) will illustrate the form of the crystals, which occur in rosettes of small hexagonal plates, several planes replacing the edges.



No. 37.

Clinoclasite is possibly the most beautiful of all the Tintic minerals, and the best specimens of it which we secured are not in any way inferior to the best English specimens. The crystals are exceedingly brilliant,

have the characteristic rich dark-blue color, appearing almost black by reflected light. The mineral occurs in two distinct types; the first in distinct crystals, which are represented in Figs. 38, 39, 40; the second in globular forms. The crystals are simple, the usual form being that shown in Fig. 38, or a combination of it with *r*. The planes *p* and



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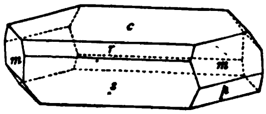

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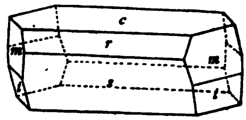


No. 40.

shown in Figs. 39 and 40 as partially replacing *m*, are new to the species. The second or globular type of Clinoclasite is due to the nearly parallel growth of the crystals. "In some of the specimens the crystals are grouped about the *b* axis, with *c* exposed. They are inclined a trifle in the zone *cb*, and also in the zone *ab*, thus rounding off the group in two directions, but decidedly more in the latter zone, forming, with the elongation in the direction of *b*, distinctly barrel-shaped forms. Occasionally the curvature in the zone *cb* is carried still further, producing globular forms. In all cases *c* forms the outer surface, and the crystals are closely crowded together, producing a bright and coarsely rough surface." The analyses (by Hillebrand) of the Utah Clinoclasite approximate quite closely to the theoretical composition.

Specimens, 25 cents to $2.00.

Chenevixite occurs in irregular masses of an olive-green to yellowish color scattered through some portions of the Tintic ores. Analysis by Hillebrand is as follows:

		Chenevixite from Cornwall.
CuO	26.31	31.70
CaO	0.44	0.34
MgO	0.16	. .
Fe_2O_3	27.37	25.10
Al_2O_3	0.66	. .
As_2O_5	35.14	32.20
P_2O_5	. .	2.30
H_2O	9.33	8.66
Quartz	0.40	. .
	99.80	100.30

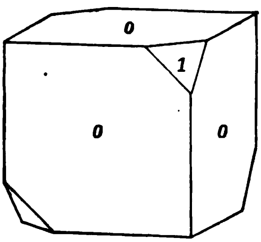
Mixite (or a closely related species) occurs sparingly in the Tintic District, in very fine silky tufts of white to greenish-white acicular crystals. The analyses are as follows:

	I. Hillebrand. a	b	Mean.	II. Pearce.	III. Schrauf. Mixite of Joachimsthal.
CuO	43.89	43.88	43.89	50.50	43.21
ZnO	2.79	2.62	2.70	. . .	. . .
CaO	0.26	0.26	0.26	3.19	0.83
Bi_2O_3 . . .	11.14	11.22	11.18	. . .	13.07
As_2O_5 . . .	27.78	28.79	28.79	27.50 }	30.45
P_2O_5 . . .	0.06	. . .	0.06	. . . }	
H_2O	11.04	11.04	11.04	12.55	11.07
SiO_2	0.36	0.48	0.42	. . .	. . .
Fe_2O_3 . . .	0.97	. . .	0.97	. . .	1.52 (FeO)
	98.29	98.29	99.31	93.74	100.15

The foregoing analyses of the Utah mineral show a close relationship between it and the mixite of Joachimsthal, " but the form of this mineral as given by Schrauf differs from that of the present one, and its color is given as emerald to bluish green. Schrauf's number for the specific gravity (2.66) is unquestionably much too low. That of the material now analyzed was 3.79 at 23½° C. When treated with nitric acid it becomes at once covered with the brilliant white coating of bismuth arseniate so characteristic of mixite. The latter mineral is stated to belong to the monoclinic or the triclinic system, while the observations of Mr. Whitman Cross would indicate that the present one can belong to neither of those systems. He says, 'The needles are very slender, with a length of more than 1 mm. in some cases, by 0.5 mm. They are deeply striated vertically, and the crystal system could not be determined, although the extinction in polarized light makes reference to the tetragonal, the hexagonal, or the rhombic system necessary. The index of refraction is high, pleochroism distinct, the colors observed being for the thicker crystals, *a* (and *b*) sea green, *c* sky blue.' "

A few specimens are in stock at 50 cents to $4.00.

Pharmacosiderite, from Utah, has been described by Mr. Pearce.



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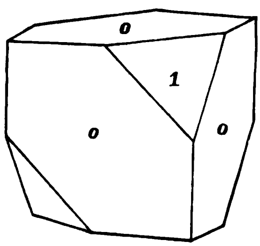

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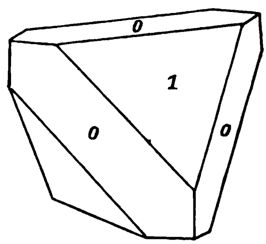


No. 43.

" The varieties of color observed in the crystals of the Utah mineral are, straw-yellow, amber-yellow, yellowish-brown, brown, pale-green, apple-

green and leek-green, varying from transparent to translucent and opaque. The crystals are either cubes without any modification, or show the usual tetrahedral development of O, modified in different degrees by I., with the characteristic diagonal striæ well-marked in some specimens." The accompanying figures illustrate the observed forms. "The exact chemical composition of the Utah pharmacosiderite has not yet been investigated, owing to lack of sufficient material, the mineral occurring very sparingly."

A few specimens are in stock at 50 cents to $1.00.

Scorodite has been found rather plentifully in the Tintic District by Mr. English, though no description of its occurrence there has been published. It has the characteristic pale leek-green color, and though the crystals are commonly very small a few specimens show quite large crystals.

Specimens, 25 cents to $2.00.

Enargite, as Mr. Pearce aptly says, is the "mother mineral" of most of the above named arsenates. It occurs massive quite abundantly in several of the mines of the district. A few small crystals have been noticed.

Good massive specimens, 10 cents to $1.00.

Jarosite from Utah.

By Dr. F. A. Genth. [From the *American Journal of Science,* January, 1890.]

Messrs. George L. English & Co. have recently brought from the Mammoth Mine, Tintic District, Utah, interesting varieties of Jarosite in minute crystals, lining cavities of a siliceous limonite, and sometimes associated with a pulverulent, yellow mineral, probably a basic ferric sulphate. The crystals are of a yellowish brown to dark clove-brown color and a very brilliant vitreous luster; they are very small, from about 0.1 to 1 mm. in size, and look so much like cubes with tetrahedral planes, that they were mistaken for pharmacosiderite. A closer inspection, however, showed their rhombohedral forms. Prof. Samuel L. Penfield had the kindness to examine them for me, and gives the following information. 'The crystals are so rounded that they will not give distinct and satisfactory reflections. From a very small crystal I obtained $R \wedge R$ 88° 27′, while Naumann gives 88° 58′ for jarosite, an agreement as close as I could expect. I also identified the base, and a very small plane—$2R$. I was able to produce basal cleavage.'

Even the best specimens placed in my hands by Messrs. English & Co. did not furnish me with absolutely pure material for analysis, owing

to the fact that the crusts are very thin and the crystals stick so fast to the siliceous matrix and often enclose the latter, that only at the expense of a great deal of time and patience, about one gram of nearly pure fragments of crystals could be obtained (I.); analysis (II.) was made with somewhat larger and darker crystals. Both show a slight contamination with siliceous limonite—but the analyses leave no doubt that the mineral is *jarosite*. Spec. grav. of I. (taken in alcohol) = 3.163. The analyses gave:

	I.	II.
SiO_2	0.08	0.29
Fe_2O_3	50.41	51.16
Na_2O	9.23	0.33
K_2O		9.05
SO_3	29.60	28.93
H_2O	10.68	10.24

[We have had a fine stock of this mineral, which was collected during Mr. English's visit to the Tintic District in June, 1889. Good specimens bring 25 cents to $1.50.]

Lettsomite from Arizona and Utah.

Contributions to Mineralogy No. 48; by F. A. Genth. [*This paper will appear soon in the American Journal of Science.*]

Geo. L. English & Co. brought this rare mineral from two new localities, but only one specimen has been obtained at each, the Copper Mountain Mine at Morenci, Graham county, Arizona and the American Eagle or Copperopolis Mine, Tintic District, Utah. They very kindly placed all their material at my disposal which enabled me to make a fuller investigation and clear away the doubts existing as to the constitution of this mineral.

1. The Arizona mineral forms narrow seams in a siliceous gangue, coated with earthy varieties of limonite. The lettsomite occurs in thin incrustations up to a thickness of about 2 mm. In small cavities it shows thin fibres, and small tufts, often with a radiated structure. Its color is from deep sky-blue to azure-blue; lustre silky. Sp. Gr. taken in alcohol, 2.737.

Some of the lettsomite has undergone an alteration, beginning with a change into a greenish yellow, and finally, by the loss of cupric oxide, into a fibrous, yellowish white mineral. At portions, where the alteration has taken place, the matrix often shows a coating of a cryptocrystalline mammillary hydrous aluminum sulphate. The analyses were made with almost pure azure-blue tufts (*a*), and nearly pure sky-blue radiating particles (*b* and *c*.)

	a.	*b.*	*c.*	Mean	Ratio	
Insoulble	0.46	0.38	0.48	0.44		
H_2O		34.47	21.89	21.89	1.216	7.8=8.
SO_3 . . .	12.38		12.59	12.49	0.156	1.0=1.
CuO . .	47.40	46.34	46.39	46.71	0.590	3.8=4.
Al_2O_3 . .	15.71	16.94	16.77	16.47	0.161	1.0=1.
Fe_2O_3 . .	0.80	1.61	1.64	1.34	0.008	
		99.74	99.76	99.34		

Considering a slight loss of CuO by alteration the ratio for SO_3 : CuO : Al_2O_3: H_2O=1: 4: 1: 8=$Cu_4Al_2[OH]_{12}$. SO_4+2H_2O. This gives the following percentage composition:

Al_2O_3 . . .	102	=	15.88
SO_3 . . .	80	=	12.56
4CuO . . .	316	=	49.23
$8H_2O$ . . .	144	=	22.43
	642		100.00

2. The lettsomite from the American Eagle Mine occurs upon a bluish green mineral which appeared to be amorphous, clay-like and evidently a mixture of clay and lettsomite. The pure lettsomite forms a velvet-like coating of azure-blue silky fibres. The specimen being very small, only 0.055 grm. could be obtained for analysis, which gave:

SO_3	12.60
CuO	49.54
Al_2O_3 . . .	15.45
Fe_2O_3 . . .	0.91
H_2O (by diff.)	21.40
	100.00

Closely agreeing with the above composition.

Chemical Laboratory, 111 S. 10th St.,
Philadelphia, April 6, 1890.

[The Lettsomite above described was collected by Mr. English during his western tour of 1889. Though our collector visited the Arizona locality subsequently no additional material was secured, and as the mine has caved in, it is not likely that any more will come into the market. We have a few small specimens (portions of the original) at $1.00 to $5.00 each, and also a few good microscopic mounts.]

Utahite.

Utahite, a new mineral species, described by Arzruni, occurs sparingly in the Eureka Hill Mine, Eureka, Utah. It occurs on a very hard quartzite, forming a crystalline crust, which the microscope shows to

be composed of minute crystals. Their color is a rich yellow-brown, and their lustre silky. They have the form of tabular hexagonal prisms, with rhombohedral planes on the alternate angles. Analysis by M. Damour resulted as follows: SO_3, 28.45; As_2O_5, 3.19; Fe_2O_3, 58.82; H_2O, 9.35 =99.81. The mineral is, therefore, a hydrous sulphate of iron, the As_2O_5 being present merely because of its association with Enargite or other arsenic minerals which occur abundantly in the vicinity.

Specimens, 10c. to $1.00.

A mineral appearing exactly like Utahite has been noticed by us on a quartz rock from the Bennett Mine, Organ Mts., New Mexico, and also associated with descloizite in the Mimbres Mines, Georgetown, N. M. We have little doubt of its identity, though Dr. Genth's partial analyses do not show an exact correspondence in composition.

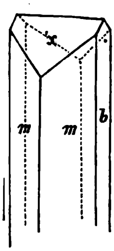
Brochantite from American Localities.

This beautiful and hitherto rare hydrous sulphate of copper is worthy of especial notice at the present time on account of its discovery at so many localities in the United States within the past few years. A brief summary of the several occurrences may not be without interest to our readers.

1. *Tintic District, Utah.*—Brochantite occurs but very sparingly in this locality, the first mention of it being in the *Proc. Colo. Sc. Soc.*, Nov. 1, 1886, Mr. Richard Pearce giving the following partial analysis:

CuO	H_2O	SO_3
68.7	12.44	Undetermined.

Further description by Hillebrand and Washington appears in the *Proc. Colo. Sc. Soc.*, Jan. 2, 1888. From this description we extract the following: "This hydrous sulphate of copper occurs in two distinct types in the specimens examined. The first, or ordinary brochantite, is of a pris-



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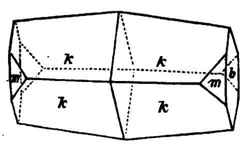

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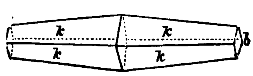
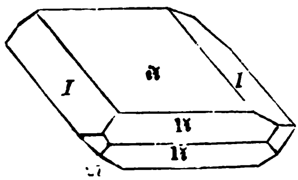


No. 46.

matic habit, as is shown in Fig. 44. The crystals are dark green and transparent, but do not give good measurements, owing to the imperfection of the surface. The cleavage parallel to b is perfect. The measured angle of $m \wedge b$, $110 \wedge 010 = 51°46'$, is only approximate, and differs considerably from Miller, who gives 52° 5′, and Schrauf, who gives 52°.

The second type is like Warringtonite from Cornwall. It is of a light green color, and has a curved, double wedge-shaped habit. The forms observed are shown in Figs. 45 and 46. The crystals were poor for measuring, all the planes, with the exception of *b*, being curved to a great degree. The crystals were none of them more than 2 or 3 mm. long, with the relative proportions of the figures. They were implanted by *b*; *m*, in Fig. 45, was identified with certainty, the angle for $b \wedge m$ being 52° approximately. The plane lettered *k* was very much curved in all cases, and its symbol, consequently, is not known with exactness."

2. *Frisco, Utah.*—During the summer of 1889, we secured from near Frisco, Utah, quite a large number of very choice specimens of Brochantite. Two different types have been observed. The first form is identical with that of the Tintic District, represented in Fig. 44. On a large majority of the specimens all of the crystals have this prismatic habit. The second type is represented by Fig. 47. This is much rarer, and has been observed more especially in isolated crystals scattered over the surface of the rock, while the prismatic crystals are generally in cavities or densely cover large surfaces of the rock. The Frisco crystals are very sharply defined, exceedingly brilliant, having highly-polished faces, and of a dark emerald-green color.



No. 47.

3. *Near Clifton, Arizona.*—Several mines within a few miles of Clifton have yielded fairly good specimens of Brochantite.

4. *Jerome, Arizona.*—Some fairly good specimens of Brochantite were collected by Mr. English during April, 1889, at the United Verde Mines, Jerome, Arizona. The determination rests upon partial analysis kindly made for us by Prof. Penfield.

5. *Globe, Arizona.*—A few fine specimens of Brochantite have reached us from the Globe District, but our collector, who visited the mines in November, 1889, was unable to secure any further good specimens.

Other Localities in the United States have been briefly noted in scientific journals, but the above are much the most important.

Aquamarine from Mt. Antero, Colorado.

The occurrence of gem aquamarines on Mt. Antero, Chaffee County, Colorado, was first noticed by Rev. R. T. Cross, in the *Amer. Jour. Sci.*, February, 1887. He says, "The two largest crystals found were three inches long and half an inch in thickness. Of those now in my possession eight crystals have terminations, and a dozen others are tolerably clear but

not terminated. The longest crystal is one and three-eighths inches in length and three-eighths of an inch in diameter. The lower third is translucent, the remainder transparent, with some flaws. This crystal, like the others, is finely striated on the prism, but the basal plane is very smooth and brilliant. The next crystal is very nearly the same size, is clear through its whole length, but has an imperfect termination. Another is three-fourths of an inch long, and on its termination shows the planes 2–2 quite large, and the planes 1 and 2 very small. The terminal edges of the prism of a number of the crystals are rounded; and some of them exhibit what appear to be slender longitudinal cavities running parallel to the prism, and probably due to striations on the original crystal now forming the core. This central part, or core, is often very distinct; it is transparent, while the outside layer, looked at lengthwise, is opaque. Sometimes the core projects at the broken end of the crystal in a globular form, similar to certain tourmalines described by Hamlin.

On examining the crystals closely, I found a few which had attached to them what seemed to be small quartz crystals. The angles, however, did not appear to agree with those of quartz, and knowing that phenacite was often mistaken for quartz, as its name suggests, I thought that they might be phenacites. Mr. W. Cross confirmed my supposition, and he placed the crystals in the hands of Mr. Penfield of the Sheffield Scientific School, who has fully described them."

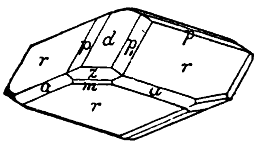
We have had many very choice crystals of the Mount Antero aquamarine in stock, at 25 cents to $3.50 each. Just now we are entirely out of them, but we hope to secure a new lot during the coming summer, so that we shall be pleased to receive orders for them.

Phenacite from Colorado.

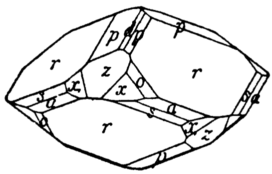
The occurrence of Phenacite in the United States was first mentioned by Messrs. Cross and Hillebrand in the *American Journal of Science,* Oct. '82. They described the lenticular crystals of the Pike's Peak region, and recorded a number of measurements of their angles. In Bulletin No. 20, U. S. Geol. Survey, the same authors described more elaborately similar, though more complex, crystals from Florissant, Colorado. Subsequent papers on the phenacite of these and adjacent localities were published in the *American Journal of Science* by Mr. W. E. Hidden and Professor S. L. Penfield.

Phenacite from Topaz Butte, Colorado.—In studying the lenticular crystals from Topaz Butte, near Florissant, "the first point noticed is their great similarity in habit to those described and figured by N. von Kokscharow, from the Ilmengebirge, Urals, where they occur with the same associations on amazon stone. All of the forms mentioned by von Kokscharow occur on the crystals from Topaz Butte, and besides them

I have found no others. His figures also represent very closely the habit of the crystals. . . . . All of the crystals which I have seen occurring on the feldspar are lenticular in shape, resulting from the slight development of prismatic and predominance of rhombohedral forms. Fig. 48 represents the form of crystals which occur with topaz on a brownish, lamellar albite. This specimen is in Prof. Brush's collection, labeled only Pike's Peak; the crystals are a trifle simpler than those occurring on the amazon stone from Florissant, and it may be that they are from some other special locality in the Pike's Peak region.



No. 48.



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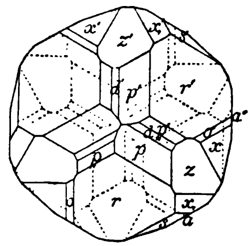


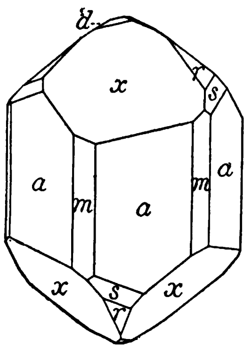
No. 50.

Here the rhombohedron *r* predominates, *d* is large, and the forms *p* and p_1 are, as is usually the case, about equally developed; the forms *z*, *a* and *m* are at times wanting, and scarcely ever more developed than shown in the figure. The crystals occurring on the amazon stone are usually more highly modified. Fig. 49 represents the forms which were observed on a crystal from Mr. C. S. Bement's collection, while Fig. 50 is a basal projection of the same with the position of the lower faces dotted in, which is well suited to show the tetartohedral character of the crystal."—Prof. S. L. Penfield, *American Journal of Science*, Feb. '87.

Phenacite from Mt. Antero, Colorado.—"Mt. Antero, in Chaffee Co., about one hundred miles southwest of Denver, fifty-five miles from Topaz Butte, and sixty-five miles a little to the south of west from Pike's Peak, . . . is over 14,000 feet high . . . and the phenacites were found by a prospector . . . probably at an altitude of 12,000 feet . . . So far as known the country rock is granite, and the associations are beryl, quartz and feldspar. The suite of specimens in the author's possession consists of eight specimens of pale, bluish-green aquamarine, upon three of which the crystals of phenacite are implanted. The crystals are prismatic, and the largest, about 7 mm. in length, is implanted in an inclined position upon the basal plane of the beryl, while others are scattered irregularly over the prismatic face. . . . .

"The beryl crystals are deeply striated parallel to the vertical axis and eaten out, having perhaps furnished the material for the formation of the phenacite. The habit of the phenacite crystals is remarkable, and is

shown in Fig. 51 in ordinary projection, and in Fig. 52 in basal projection. In the prismatic zone the prism of the second order *a* prevails, while *m* is always small, in some cases wholly wanting. The crystals are terminated mainly by the rhombohedron of the third order *x*, $\bar{1}3\bar{2}2, -r\frac{3}{2}-\frac{3}{2}$: the unit rhombohedron *r* is small, and in a zone between it and the prism *a* is the rhombohedron of the third order *s*. At the top of the crystal are the three small faces of the minus rhombohedron *d*. The prismatic faces are striated not only vertically, especially that part of the prism farthest away from the *s* face, but also near each *s* face parallel to the intersection between *s* and *a*. These two sets of striations do not cross, but meet along



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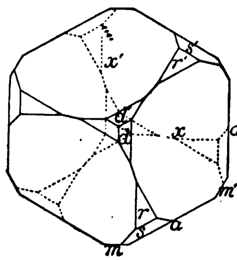
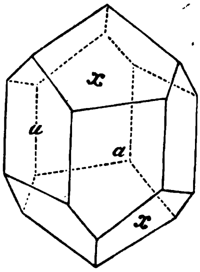


No. 52.

a line running in an inclined direction across the *a* face; the *s* and *r* faces, especially the former, are also striated parallel to the intersection between *s* and *a*. These striations point to vicinal faces, prisms and rhombohedrons of the third order, but no definite indices could be assigned to them. The *x* faces are not smooth and polished, but covered with little prominences, with curved, unsymmetrical contours. Crystals with exactly this habit have been previously described by Professor M. Websky of Berlin, from an unknown locality in Switzerland, and they are the only crystals, so far described, which are terminated mainly by rhombohedrons of the third order. It is interesting also to note that while in the Russian localities the crystals of phenacite occurring on amazon stone are lenticular, as is the case also in Colorado, the crystals from the emerald mines of Katharinenburg are prismatic, terminated, however, not by rhombohedrons of the third, but by those of the first and second order."—Prof. S. L. Penfield, *A. J. S.*, Feb. '87.

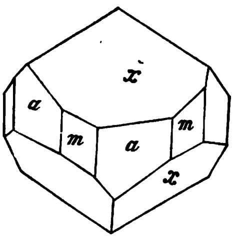
"The crystals are attached to quartz, transparent beryl (aquamarine, sometimes with good terminations), and Baveno twins of orthoclase, and are associated with muscovite and octahedral fluorite. All of the specimens we have seen . . . show two prominent developments. One of these . . . always occurs among those crystals which are attached to

quartz or beryl, and is represented in its simplest form in Fig. 53, which shows the combination of *a* ($11\bar{2}0$, *i*—2) and *x* ($\bar{1}3\bar{2}2$, $-r\frac{1}{4}$ ($\frac{3}{2}-\frac{3}{2}$)), giving a very interesting form, owing to the unusual combination of a prism of the second with a rhombohedron of the third order; sometimes there are associated with these small faces of *m* ($10\bar{1}0$, I), *s* ($21\bar{3}1$, $+r\frac{1}{4}$ ($3-\frac{3}{2}$)), *r* ($10\bar{1}1$, $+1$), and *d* ($01\bar{1}2$, $-\frac{1}{2}$) as represented in Figs. 51 and 52 of the previous communication. The second habit, which is found among those crystals which are attached to orthoclase, has two prisms well developed, and is short prismatic (Fig. 54), frequently much shorter than represented in the illustration. Many of the crystals are of considerable size, measuring over one-half inch in diameter and one inch in length. The *x* faces on the larger crystals are always dull and rough, and the prismatic faces vertically striated."—Prof. S. L. Penfield, *A. J. S.*, Nov. '88.



No. 53.

A very interesting twin crystal of phenacite from Mount Antero has very kindly been drawn expressly for us by Professor Penfield, and is represented in Fig. 55. We believe but three of these crystals have been discovered.



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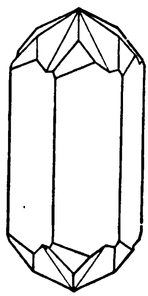
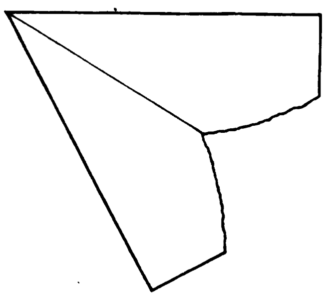


No. 55.

We have spared no effort to secure all the phenacites obtainable at the Mount Antero localities, Mr. English having visited the mountain during the summer of '88, and our Colorado collector having made three trips up the mountain, and devoted several weeks' time to thorough prospecting. As the result, we have secured many hundred choice specimens, all of the finest having passed through our hands. Specimens, with excellent prismatic crystals on beryl, orthoclase, or quartz, 50 cents to $10.00. Loose crystals, 25 cents to $5.00. The finest specimens sold at $5.00 to $25.00. We can also supply detached lenticular crystals from Florissant, at 10 cents to $1.00 each, and gangue specimens at 50 cents to $2.50.

Bertrandite from Mt. Antero, Colorado.

THE occurrence of this very rare mineral at the celebrated Phenacite locality on Mt. Antero, was first noticed by Mr. W. B. Smith, and the single specimen at first found was described with characteristic accuracy and minuteness of detail by Prof. S. L. Penfield in a very interesting paper in the *Amer. Jour. Sci.*, July, 1888. He says, "The crystals of Bertrandite are attached to quartz, which is associated with beryl. Other minerals occurring at the locality are phenacite, orthoclase, muscovite and fluorite. The crystals are little rectangular blades 5 mm. long, 2 mm. wide and 0.2–0.4 mm. thick. The largest faces, 5×2 mm., correspond to the basal plane of Bertrand lengthened out in the direction of the brachy-axis, $\breve{a}$, and marked by slight striations parallel to the shorter diameter or macro-axis, $\bar{b}$. Opposite this flat basal plane the crystals have a curved surface composed of the basal plane and brachydomes in oscillatory combination. The curved surface either joins the basal plane directly, forming a sharp, thin edge along the whole length of the crystal, or a narrow brachy-pinacoid is present between them. The curious development gives to the crystals a hemimorphic aspect which is very characteristic and not accidental; for all of the eight or ten crystals on the specimen were of this same character. The general shape of the crystals is that of a thin slice cut from the side of a cylinder parallel to its axis. The crystals are attached at one end, and are terminated at the free end by a macropinacoid. The observed planes are therefore the three pinacoids, one of the basal planes being rounded by oscillatory combinations parallel to the brachy-axis. The faces have a good lustre, that of the basal plane being pearly, the others vitreous. They are not well suited for measurement. There was one V-shaped twin in the specimen, the twinning plane being the brachy-dome 031 ($3-\breve{i}$) of Bertrand. The flat basal planes formed the outside limbs of the V, and made an angle of 61° 52′ with one another, the curved surfaces formed the re-entrant angle. [Fig. 56 represents a cross section of a twin bertrandite projected upon the macro-pinacoid, the drawing being very kindly made for us by Prof. Penfield.] Similar twins are described by Bertrand with re-entrant angle of about 60°. Two cleavages were identified, prismatic and basal, both highly perfect. . . . . I cannot give a reason for the hemimorphic development of the basal plane. If Scharizer is correct in assuming that the crystals are monoclinic with the brachy-axis of Bertrand as the ortho-



No. 56.

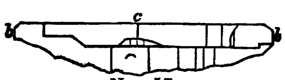
axis, such a development might result from twinning about an orthopinacoid, one basal plane being converted into a curved surface by oscillations with hemi-orthodomes, symmetrically situated on either side of the twinning plane. This would require for $\beta = 90° 28' 34''$ (Scharizer's value for the inclination of the $\underline{a}$ and $\underline{c}$ axes), a salient angle along the twinning line on the base of 180° 57′ which could not be detected. A section across the crystals, parallel to Scharizer's clino-pinacoid, should also show an inclined extinction, which would be especially marked along the twinning limit; a section thus prepared shows perfectly normal orthorhombic symmetry in polarized light. The optical properties point most decidedly to orthorhombic symmetry. . . . The hardness of the crystals is 6–7. They scratch feldspar readily, and with care can be made to scratch quartz, though they are apt to crush, owing to their small size and good cleavage. The specific gravity, taken with the Thoulet solution, is 2.598. . . .

By sacrificing all but one of the small crystals, and scraping off the remnants of broken crystals from the quartz, I succeeded in obtaining 0.1259 grams of material which floated on the Thoulet solution at 2.610, and sank at 2.551 sp. gr. This was subjected to a very careful chemical analysis with the following results:

	Penfield.	Damour.	Theory for $H_2Be_4Si_2O_9$.
SiO_2	51.8	49.26	50.42
BeO	39.6	42.00	42.02
CaO	1.0	. . .	. . .
H_2O	8.4	6.90	7.56
Fe_2O_3	. . .	1.40	. . .
	100.8	99.56	100.00

The analysis is satisfactory, considering the small quantity of material at my command. The BeO which was precipitated with ammonia was free from alumina, and gave the characteristic beryllium reactions. The mineral lost 0.5 per cent. by drying at 100 ° C., and 1.40 per cent. at a faint red heat. The water in the analysis is too high, and probably part of it does not belong to the composition of the mineral. The microscopic sections show liquid inclusions, which are not CO_2, and are probably water, which may account for some of the excess."

In a paper in the *American Journal of Science*, March, '89, Prof. Penfield describes a new find of bertrandite at Stoneham, Maine, and adds a brief note on the Mount Antero crystals, and the accompanying figure.



No. 57.

He says: "Figure 57 represents a section across one of the Mount Antero crystals parallel to the macropinacoid, which was drawn with a camera lucida, and magnified 17 diameters. During the past summer a number of bertrandite specimens were found, and all of them showed this peculiarity. Some of the

crystals which are now in the collection of Mr. C. S. Bement of Philadelphia [purchased from G. L. E. & Co.], are 25 mm. long, 8 mm. wide, and 3 mm. thick. That the rounding of one of the basal planes is not accidental, but is owing to a hemimorphic development of the crystals, cannot be doubted. As proof of this, one of the largest crystals was tested for pyro-electricity by the admirable method proposed by Prof A. Kundt. The crystal was heated in the air bath to 100° C., and on cooling was dusted with a mixture of red oxide of lead and sulphur. The experiment was most satisfactory; the flat basal plane showed strong positive electricity, and became coated with the yellow sulphur, while the rounded basal plane showed negative electricity, and was coated with red oxide of lead. Tests for pyro-electricity were also made on the Stoneham crystals, but they were so small that it could scarcely be determined with certainty. It seemed, however, as if the basal plane in combination with the $\underline{d}$ face showed positive electricity, the same as the flat basal plane of the Mount Antero crystals, while the other basal plane showed negative electricity.

"In closing, I wish to express my thanks to Messrs. George F. Kunz and C. S. Bement, who provided me with material for study, and to Mr. George L. English of Philadelphia, who sent me a large number of Mount Antero crystals for examination."

All of the crystals from Mount Antero (except the first specimen) have passed through our hands, at prices ranging from 50 cents to $25.00. During July, '89, we sent our collector again to the locality, and he secured the largest and finest lot we have yet had, including many very excellent single and twin crystals, both loose and on a quartz-beryl gangue. We still have fine specimens, at $1.00 to $3.50 each. Inferior specimens, 10 cents to 75 cents.

Some other Interesting Colorado Minerals.

Loose Amethyst Crystals.—A new locality in Saguache county, Colorado, has recently yielded some curiously developed quartz crystals, the majority of which are amethystine colored at the top. The crystals average about 1¾ inches long by ⅜ inches in diameter, and are interesting on account of the high development of the rhombohedral planes, and the frequent occurrence of trihedral terminations, as well as in the existence of enclosed crystal cavities of nearly the form of the Herkimer crystals, and so entirely different from the form of the crystals in which they are included. These crystals have been very popular among scientific mineralogists, at 10 cents to 75 cents each.

Byssolitic Quartz Crystals.—We have secured a very fine, large lot of quartz crystals from Calumet, Colorado, in which long needles of bysso-

lite are enclosed, and also occasionally chlorite. The low prices, 10 cents to 75 cents, have been selling them rapidly.

Blue Barite, Colorado.—Over three hundred specimens have been secured from the new locality near Sterling, Colorado. All the specimens now in stock are loose, terminated crystals, a few of them doubly terminated. The color is pale blue and the average size about ½ x 2½ inches. Prices, 10c. to $1.50. A 1½ inch terminated crystal, 20c.

Salida Garnets.—These very interesting crystals are invariably rhombic dodecahedrons, generally more or less distorted. The analysis of Penfield and Sperry proves that they belong to the Almandite, or iron-alumina variety. The garnets are always superficially altered to aphrosiderite, a soft ferruginous chlorite of a dark olive-green color. This mineral forms an even coating of not over an eighth of an inch in thickness, which can readily be peeled off, leaving the dark red garnet clean. The most remarkable peculiarity of the Salida garnets is their size. They average about 2½ inches in diameter (¾ lb.) and have been found even up to about six inches (14¾ lbs.); they are but rarely smaller than one inch.

Zunyite is an interesting mineral described by W. F. Hillebrand in Bulletin No. 20, U. S. Geol. Survey (1885). It occurs in the Zuñi Mine on Anvil Mt., near Silverton, Colorado. "A portion of the ore from this mine consists, when unaltered, of an uncrystallized sulphide of lead and arsenic, upon broken surfaces of which appear numberless projecting glassy faces of tetrahedra of the regular system . . . Their size varies from that of extreme minuteness to a diameter, in rare instances, of 5 millimeters. The smallest of the crystals are generally quite clear and transparent, but the vast majority carry more or less uncrystallized, unmagnetic, black inclusions." The luster is glassy, cleavage octahedral, hardness about 7, specific gravity about 2.9. The analyses of the purest crystals yielded Dr. Hillebrand the following results:

SiO_2	24.33
Fe_2O_3	0.20
Al_2O_3	57.88
K_2O	0.10
Na_2O	0.24
Li_2O	trace
H_2O	10.89
P_2O_5	0.60
F	5.61
Cl	2.91
	102.76
Less O for F and Cl	3.02
	99.74

From these results the following atomic ratio is deduced:

(H, K, Na)	:	Si	:	(Al_2)	:	(O, F_2, Cl_2)
18.00	:	6.00	:	8.00	:	45.00

giving the formula:

$$9R_2O,\ 6SiO_2,\ 8Al_2O_3,$$

with part of the oxygen replaced by fluorine and chlorine.

"The Fe_2O_3 of the above analyses came undoubtedly from a thin film of ferric oxide on the tetrahedral crystals . . The P_2O_5 . . . is probably derived from a small proportion of an admixed aluminum phosphate. The excess of alumina constantly found over that required for the above formula renders this the more likely." Specimens 10c, to $1.00.

Guitermanite.—Forming the matrix of the Zunyite crystals, is a bluish gray metallic mineral which Dr. Hillebrand's analyses proved to be another new species. In composition it is essentially a sulphide of lead and arsenic, either 10PbS, $3As_2S_3$, or 3PbS, As_2S_3.

Sperrylite.

An exhaustive description of this new mineral species by Professors Wells and Penfield of Yale University, appeared in the *American Journal of Science* for January 1889. Few recently described minerals possess more of interest to the scientist than this. In chemical composition it is essentially a pure arsenide of platinum, represented by the symbol, $PtAs_2$, "a small portion of the platinum and arsenic being replaced respectively by rhodium and antimony." The analyses by Prof. Wells are as follows:

	I.	II.	Mean.
As . .	40.91	41.05	40.98
Sb . . .	0.42	0.59	0.50
Pt . . .	52.53	52.60	52.57
Rh . .	0.75	0.68	0.72
Pd . .	trace	trace	trace
Fe . .	0.08	0.07	0.07
SnO_2 .	4.69	4.54	4.62
	99.38	99.53	99.46

The SnO_2 of the analysis is shown to be cassiterite, present as an impurity. "In composition this mineral appears to be nearer Wöhler's laurite than any other mineral now known." It occurs as a brilliant tin-white sand, intermixed with fragments of chalcopyrite, pyrrhotite, and some silicates, in pockets in decomposed masses of gold quartz at the Vermillion Mine, District of Algoma, Ontario. Its specific gravity is 10.602. Hardness between 6 and 7. Cleavage, none. Fracture, probably conchoidal. Its crystalline form Prof. Penfield says "is isometric; pyritohedral. Simple cubes are common, octahedrons are exceptional, while the majority of the crystals, which are usually fragmentary, show combinations

of cube and octahedron. . . . At first only the above mentioned forms were detected, but . . . some were detected which suggested pyrite forms. The chemical relation of the mineral $PtAs_2$ to the minerals of the pyrite group caused me to make a very careful search for pyritohedral forms, which was fortunately successful. Cubes with replacement of the edges are very exceptional; a number of them were found, however, and in all cases the replacements, which were necessarily small and frequently failed on some of the edges, had the arrangement required by the combination of cube and pyritohedron. The best crystal selected for measurement was the top of a cube measuring 0.35 x 0.45 mm. in combination with octahedron and two small but well developed pyritohedral faces . . . Another crystal . . was developed in all directions; in one zone the four cubic and four pyritohedral faces were all present in their proper order and gave satisfactory measurements, in a second zone four cubic and two pyritohedral faces were found and in the third zone four cubic and one truncating rhombic dodecahedral face were detected; this is the only case in which a dodecahedral (110) face was found. In a few cases the characteristic combination of octahedron and pyritohedron was detected, but the latter faces were always very small. These results are most satisfactory, and from the number of crystals which have been examined and measured, in all of which the pyritohedral faces occur with their proper order and arrangement, the hemihedral nature of the mineral cannot be doubted. Some of the crystals are somewhat rounded, and probably other isometric forms are present, but none of them were determined . . . To sum up the crystallographic observations, the crystals usually show the combination of cube 100, *i-i*; octahedron 111,1; pyritohedron π (210), $\frac{1}{2}$ (*i*-2) and very rarely dodecahedron 110, *i*. Taken in connection with the chemical results the mineral takes a place in our classification in the pyrite group where an atom of a metal, usually Fe, Co or Ni, is united with two atoms of either S, As or rarely Sb, or an isomorphous mixture of them. As this is the first time that platinum has been found in combination as a mineral it may be noted that Fe, Co and Ni and the metals of the platinum group fall in the same series in Mendelejeff's periodic system of the elements, which gives additional grounds for putting this mineral in the pyrite group." We can supply Sperrylite at $3 per gram.

Other Canadian Minerals.

Having visited all the important Canadian localities we have a good stock of such of those minerals as are to be had.

Zircons are no longer obtainable in *fine* specimens, but we can always supply cheap student specimens at 5c. to $1.00.

Apatite crystals average in price about as follows: One-inch crystal, one good termination, 5c. each; 2-inch, one termination, 15c.; 2-inch,

doubly terminated, 25c.; 3-inch, one termination, 20c.; 3-inch, doubly terminated, 50c.; 4-inch, one termination, 25c.; 4-inch, doubly terminated, 75c.; larger crystals, 50c. to $1.50 each.

Titanite, good, single crystals 5c. to $1.00; *twin* crystals, 25c. to $2.00.

Pyroxene is in stock in exceedingly good groups of crystals at 25c. to $4.00; small loose crystals, 5c. to 25c.

Other Canadian minerals can also be supplied at most reasonable figures, as follows: Amphibole, Biotite, Green Garnet, Molybdenite, Chrysotile, Orange Calcite, Kermesite, Scapolite, &c.

English Minerals.

We believe we can confidently claim that our various importations of English minerals have contained more choice specimens than have ever before been brought into the United States. Adhering to our policy of purchasing only *good* material, our customers will find that there are really *no poor specimens* from England in our stock. Our London agent has unequalled facilities for securing the *very best* specimens, and as his last consignment numbered over 3,000 specimens, it must be evident that our stock of English minerals is unequalled in the United States.

Egremont Calcite. We have had the best and largest of the superb twin crystals ever offered for sale in this country. The two finest crystals were sold at $17.50 each. Choice twins can be supplied at 50c. to $10.00. Clear, single crystals, 5c. to $2.00; groups of clear crystals, 25c. to $2.50. The brilliancy and beauty of these celebrated calcites can scarcely be conceived by those who are not acquainted with them.

Stank Mine Calcite, ever popular, and deservedly so, are strongly represented in our stock. The groups which are in part colored red by their hematite gangue, are most in demand. Prices, 25c. to $2.50 for cabinet sizes; $3.00 to $10.00 for museum specimens.

Bigrigg Mine Calcites, new, clear, brilliant, and very highly modified crystals in groups, at same prices as those from the Stank mine, which they somewhat resemble.

Iridescent Pyrite on Calcite.—Two large importations were entirely sold out almost immediately. We hope to secure another lot, and, as the prices average only 25 cents to $2.50, our customers will be able to secure some of the most beautiful specimens ever seen.

Fluorite, from England, is one of the first minerals which a beginner wants, and, after his collection has grown until he numbers them by the thousand, he wants English fluorites, because of their beauty and great variety. Our stock is very complete, so that whether you want a green or a purple, a white or a black, a blue or a yellow, you will find us able to supply you. Prices, 10 cents to $2.50 for cabinet sizes; $2.50 to $25.00 for museum specimens.

Aragonite in radiated tufts of terminated crystals, two to four inches long, 25 cents to $2.50.

Hematite, or Specular Iron, in very brilliant, tabular crystals with quartz, exceedingly beautiful, 25 cents $2.50. *Kidney Ore,* very good, 25 cents to $1.50.

Cassiterite, small crystal groups, as low as ten cents. A lot of very choice prismatic crystals on the gangue, $1.00 to $3.00.

Dolomite, iridescent, pretty, 25 cents to $1.00.

Barite, from the Bigrigg mine, of an exquisite, delicate blue and green, the crystals highly polished and perfect, 20 cents to $1.25. These are very attractive. Also a very full stock of all the many other varieties of barite.

Celestite from Yate, in groups of large, tabular crystals, 50 cents to $2.50.

Bournonite, choice, 25 cents to $2.00.

Chalcocite, well crystallized, 25 cents to $2.00.

Mimetite, var. Kampylite, 50 cents to $2.50.

Torbernite, small specimens, well crystalized, 25 cents to 75 cents; larger, $1.00 to $2.00.

Göthite, in slender crystals, 25 cents to $1.50.

Chalcosiderite, a fine stock, 25 cents to $2.00.

Chalcotrichite, choice, 25 cents to $2.00.

Cuprite, fine crystal groups, 10 cents to $2.00.

Olivenite, Pharmacosiderite, Scorodite, Liroconite, Chalcophyllite, Libethenite, Ludlamite, Cronstedtite, Tetrahedrite, Tennantite, Childrenite, Bismuthinite, Stannite, Autunite, Witherite, Barytocalcite, Dufrenite, Marcasite, Apatite, Gilbertite, &c., in good specimens, at prices recorded in this catalogue.

Spangolite.

This mineral is the latest addition to the long list of new species, it having been described in the May number of the *Amer. Jour. Science,* by Prof. S. L. Penfield. Only a single specimen is, as yet, known, but it is one of exceeding beauty and perfection. The mineral occurs in rich, dark green hexagonal crystals with the basal plane very prominent. Its hardness is about 2 to nearly 3; specific gravity, 3.141. The analyses of Prof. Penfield prove that Spangolite is a hydrous chloro-sulphate of copper and alumina, corresponding with the formula, $Cu_6AlClSO_{10}, 9H_2O$. "There is at present no known mineral similar to Spangolite in composition; the very rare Connellite from Cornwall . . . is the nearest approach to it." The mineral is certainly one of unusual interest and it is a cause for congratulation that it has been named after the well-known, generous and enthusiastic collector, Mr. Norman Spang.

Classified List of Mineral Species.

The following list includes all mineral species described in Dana's *System of Mineralogy*, also all species described in the Appendices, whose exact position in the System is given. The list of New Species, which is added, includes all authenticated species described in the three Appendices to Dana's System, as well as in the *American Journal of Science* from January, 1882, to May, 1890, whose place in the System is not given. We believe this includes practically all species described up to date. Bad or doubtful species which have not a recognized place in the science, are omitted entirely, or are merely mentioned in the Index. The *important* varieties are enumerated under the proper species, or, if omitted, their position in the classification may be ascertained by reference to the Index. The number preceding the name is the species number in Dana's *System of Mineralogy*. In the preparation of this list, we have spared no effort to make it correct. Where authorities differ, we have invariably followed Dana, though queries placed by him have been omitted, in some instances, when we found them removed in the more recent works of other eminent authors. Abbreviations have been avoided throughout in designating the crystallographic form and chemical composition; A. J. S.=*American Journal of Science;* Ap.=Appendix to Dana's *System of Mineralogy;* Sm. Rept.=Annual Report of Smithsonian Institution; Var.=Variety. The word "Massive" is used in all cases where the crystallographic form of a mineral is not known. It is not, therefore, to be understood *technically*, as a mineral so described may really be crystallized, as, for example, Lettsomite; or crystalline, Erinite; or fibrous, Crocidolite; or stalactitic, Limonite; or concretionary, Beauxite; or micaceous, Phyllite.

The prices given in the accompanying list are *average* and *not* necessarily (as in all previous editions of our Catalogue), those of actual specimens in stock. They are, however, based on specimens which we have ourselves handled, so that while in some cases we quote prices on species which are not in stock at the present time, it is reasonable to assume that we can supply at any time at least seventy-five per cent. of all the species quoted, and that all others which have prices attached, and indeed many others not priced at all, are *likely* to be in stock from time to time. We shall be pleased to file orders for all species not in stock, which a customer desires, and such filing of orders will give him an option on the first specimens we receive thereafter. Owing to our extensive facilities for securing minerals, our stock of even the rarest species is constantly being replenished. *Only characteristic specimens are quoted*, so that the lowest priced are by no means unworthy of the attention of the student. In many cases we have extra fine specimens in stock at higher prices than those mentioned; but as such specimens are quickly sold, we have thought it best to adopt *average* prices throughout. We have not endeavored to state the lowest figure at which we can supply specimens, for our material is in general of a superior quality; but though our specialty is *good* specimens, we can generally supply a cheaper grade to those desiring them. Perfection of crystallization, disposition of crystals on the matrix, individual modifications or peculiarities in crystals, brilliancy, shapeliness, etc., all influence a mineralogist's estimate of value. Our customers are therefore especially urged in ordering of us to state the approximate *prices* which they are willing to pay, and to leave the *size* of the specimens to be sent them at least in part to our discretion.

Each specimen sent out by us has the price plainly marked, and is accompanied by a label giving the species number, name and locality. Appreciating that accuracy of labeling is of first importance, we make it our rule to refer all doubtful material to an eminent mineralogist for determination. We, therefore, guarantee the correctness of the labeling of every specimen.

Postage or Express Charges must in all cases be borne by Purchasers.

SYNOPSIS OF THE CLASSIFICATION OF MINERALS.

I. Native Elements.
II. Sulphides, Tellurides, Selenides, Arsenides, Antimonides, Bismuthides.
III. Compounds of Chlorine, Bromine, Iodine.
IV. Fluorine Compounds.
V. Oxygen Compounds.
  I. Oxides, or Binary Oxygen Compounds.
    I. Oxides of Elements of Gold, Iron, and Tin Groups.
    II. Oxides of Elements of Arsenic and Sulphur Groups.
    III. Oxides of Elements of Carbon–Silicon Group.
  II. Ternary Oxygen Compounds.
    1. Silicates.
      A. Anhydrous Silicates.
        I. Bisilicates.
        II. Unisilicates.
        III. Subsilicates.
      B. Hydrous Silicates.
        I. General Section of Hydrous Silicates.
        II. Zeolite Section.
        III. Margarophyllite Section.
        Appendix to Hydrous Silicates.
    2. Tantalates, Columbates.
    3. Phosphates, Arsenates, Antimonates, Nitrates.
      A. Phosphates, Arsenates, Antimonates.
        I. Anhydrous.
        II. Hydrous.
      B. Nitrates.
    4. Borates.
    5. Tungstates, Molybdates, Vanadates.
    6. Sulphates, Chromates, Tellurates.
      I. Anhydrous.
      II. Hydrous.
    7. Carbonates.
      I. Anhydrous.
      II. Hydrous.
    8. Oxalates.
VI. Hydrocarbon Compounds.

I. NATIVE ELEMENTS.

1. **Gold,** 25c. to $50.00; isometric; comp. gold.
  Var. 1. Ordinary, containing 0.16 to 16 p. c. of silver.
  2. Electrum, containing over 16 p. c. of silver.
  3. Porpezite, contains palladium.
  4. Rhodium-gold, contains rhodium.

1A. **Maldonite** (Ap. I., p. 10), comp. gold, 64.5, bismuth 35.5, or Au_2Bi.
2. **Silver,** 5c. to $10.00; isometric; comp. silver.
3. **Platinum,** 25c. to $5.00; isometric; comp. platinum, etc.
4. **Platiniridium,** isometric; comp. platinum and iridium.
5. **Palladium,** isometric; comp. palladium, etc.
6. **Allopalladium,** hexagonal; comp. palladium.
7. **Iridosmine,** hexagonal, 25c. to $2.00; comp. iridium and osmium.
8. **Mercury,** 10c. to $1.00; isometric; comp. mercury.
9. **Amalgam,** $1.00 to $10.00; isometric; comp. silver and mercury.
10. **Arquerite,** 25c. to $2.00; isometric; comp. silver and mercury.
10A. **Kongsbergite** (Ap. II., p. 32), comp. silver and mercury.
11. **Gold Amalgam,** in grains and square prisms; comp. gold and mercury.

12. **Copper,** 5c. to $2.50 ; isometric; comp. copper.
13. **Iron,** 25c. to $10.00; isometric; comp. iron and nickel, etc.
    Var. 1. Native, Greenland, 25c. to $1.00.
    2. Meteoric, 25c. to $10.00. We make no specialty of Meteorites, but two or three of the best known falls are always in stock, among them Toluca, Estherville, Glorietta, Knyahinya, etc.
14. **Zinc,** hexagonal; comp. zinc, etc.
15. **Lead,** $2.50 to $10.00; isometric; comp. lead.
16. **Tin,** tetragonal; comp. tin.
17. **Arsenic,** 10c. to $2.00; rhombohedral; comp. arsenic.
18. **Antimony,** 10c. to $2.50; rhombohedral; comp. antimony.
19. **Allemontite,** 25c. to $2.50; rhombohedral; comp. arsenic and antimony.
20. **Bismuth,** 25c. to $2.50; hexagonal; comp. bismuth.
21. **Tellurium,** 25c. to $2.50; hexagonal; comp. tellurium.
22. **Native Sulphur,** 5c. to $10.00; orthorhombic; comp. sulphur.
23. **Selensulphur,** 50c. to $2.50; resembles sulphur, but of an orange or brown color, and contains selenium.
24. **Diamond,** $1.00 to $10.00; isometric; comp. carbon.
25. **Graphite,** 5c. to 50c.; hexagonal; comp. carbon.

II. SULPHIDES, TELLURIDES, SELENIDES, ARSENIDES ANTIMONIDES, BISMUTHIDES.

26. **Realgar,** 10c. to $3.50; monoclinic; red sulphide of arsenic.
27. **Orpiment,** 10c. to $2.00; orthorhombic; yellow sulphide of arsenic.
28. **Dimorphite,** orthorhombic; a sulphide of arsenic, now regarded as identical with orpiment.
29. **Stibnite,** 5c. to $5.00; orthorhombic; sulphide of antimony.
29A. **Livingstonite** (Ap. II., p. 35), orthorhombic (?); sulph-antimonide of mercury.
30. **Bismuthinite,** 25c. to $2.50; orthorhombic; sulphide of bismuth.
31. **Tetradymite,** 25c. to $5.00; hexagonal; telluride of bismuth.
32. **Josëite,** hexagonal; seleno-telluride of bismuth.
33. **Wehrlite,** hexagonal; probably a sulph-telluride of bismuth.
33A. **Arsenotellurite,** (Ap. II., p. 5.); massive; sulph-arsenide of tellurium.
34. **Molybdenite,** 5c. to $2.00; orthorhombic (?); sulphide of molybdenum.
35. **Dyscrasite,** $2.00 to $5.00; orthorhombic; antimonide of silver.
    Var. Chanarcillite; arsenio-antimonide of silver.
36. **Chilenite,** amorphous; bismuthide of silver.
37. **Domeykite,** $2.50 to $5.00; massive; arsenide of copper, Cu_3As.
    Var. Condurrite, softer, and possibly containing also arsenite of copper.
38. **Algodonite,** massive; arsenide of copper, Cu_6As.
39. **Whitneyite,** massive; arsenide of copper, Cu_9As.
40. **Argentite,** 50c. to $5.00; isometric; sulphide of silver.
40A. **Argentopyrite,** sulphide of silver and iron. (See Ap. III., p. 115).
40B. **Jalpaite,** isometric; cupriferous sulphide of silver.
40C. **Polyargyrite,** (Ap. I., p. 12); isometric; sulph-antimonide of silver.
41. **Naumannite,** isometric; selenide of silver.
42. **Eucairite,** massive; selenide of copper and silver.
43. **Crookesite,** massive; selenide of copper, thallium and silver.
44. **Galenite,** 5c. to $5.00; isometric; sulphide of lead.
44A. **Huascolite,** sulphide of lead and zinc.
44B. **Cuproplumbite,** mixture of galenite and chalcocite.
45. **Clausthalite,** isometric; selenide of lead.
    Var. Tilkerodite, contains cobalt.
46. **Zorgite,** $1.00 to $2.50; massive; selenide of lead and copper.
47. **Lehrbachite,** massive; selenide of lead and mercury.
48. **Altaite,** 50c. to $2.50; isometric; telluride of lead.
49. **Bornite,** 5c. to $1.00; isometric; sulphide of copper and iron.
50. **Berzelianite,** massive; selenide of copper.
51. **Castillite,** massive; sulphide of silver. copper, lead, iron and zinc

52. **Alabandite,** 10c. to $2.00; isometric; sulphide of manganese.
53. **Syepoorite,** massive; sulphide of cobalt.
54. **Pentlandite,** isometric; sulphide of nickel and iron,
55. **Grünauite,** isometric; sulphide of nickel, bismuth, iron, cobalt and copper.
56. **Sphalerite,** 5c. to $7.50; isometric; sulphide of zinc.
56A. **Oldhamite,** (Ap. II., p. 42); isometric; meteoric sulphide of calcium.
57. **Voltzite,** massive; oxy-sulphide of zinc.
58. **Hessite,** $1.00 to $5.00; orthorhombic; telluride of silver.
58A. **Petzite,** 50c. to $5.00; telluride of silver and gold.
59. **Daleminzite,** orthorhombic; sulphide of silver.
60. **Acanthite,** $1.00 to $5.00; orthorhombic; sulphide of silver.
61. **Chalcocite,** 10c. to $2.50; orthorhombic; sulphide of copper.
62. **Stromeyerite,** $1.00 to $2.50; orthorhombic; sulphide of silver and copper.
63. **Sternbergite,** orthorhombic; sulphide of silver and iron.
64. **Cinnabar,** 5c. to $2.50; rhombohedral; sulphide of mercury.
64A. **Metacinnabarite** (Ap. I., p. 10), 25c. to $3.50; isometric; sulphide of mercury.
65. **Tiemannite,** 50c. to $5.00; isometric; selenide of mercury.
65A. **Onofrite,** 50c. to $2.50; massive; sulpho-selenide of mercury.
66. **Millerite,** 5c. to $2.00; rhombohedral; sulphide of nickel.
66A. **Beyrichite,** (Ap. I, p. 3) hexagonal (?); sulphide of nickel.
67. **Troilite,** massive; meteoric sulphide of iron and nickel. (?)
68. **Pyrrhotite,** 5c. to $2.50; hexagonal; sulphide of iron.
68A. **Chalcopyrrhotite** (Ap. II., p. 11), massive; sulphide of iron and copper.
69. **Greenockite,** 10c. to $1.00; hexagonal; sulphide of cadmium.
70. **Wurtzite,** hexagonal; sulphide of zinc.
71. **Niccolite,** 10c. to $2.00; hexagonal; arsenide of nickel.
71A. **Arsenical Cobalt,** (Ap. I., p. 1); hexagonal; arsenide of cobalt.
72. **Breithauptite,** 25c. to $2.50; hexagonal; antimonide of nickel.
72A. **Arite,** (Ap. II., p. 4); massive; antimonide and arsenide of nickel.
73. **Kaneite,** massive; arsenide of maganese.
74. **Schreibersite,** massive; phosphide of iron and nickel.
75. **Pyrite,** 5c. to $5.00; isometric; sulphide of iron.
76. **Hauerite,** isometric; sulphide of manganese.
77. **Cubanite,** isometric; sulphide of copper and iron.
78. **Chalcopyrite,** 5c. to $5.00; tetragonal; sulphide of copper and iron.
79. **Barnhardtite,** massive; sulphide of copper and iron.
80. **Stannite,** 10c. to $1.50; tetragonal (?); sulphide of tin, copper, iron and zinc.
81. **Linnaeite,** 50c. to $2.50; isometric; sulphide of cobalt.
    Var. Siegenite; 50c. to $2.50.
81A. **Horbachite** (Ap. II., p. 28), massive; sulphide of iron and nickel.
82. **Carrollite,** isometric; sulphide of copper and cobalt.
83. **Smaltite,** 10c. to $7.50; isometric; arsenide of cobalt, nickel and iron.
    Var. 1. Cobaltic Smaltine.
    2. Niccoliferous, Chloanthite.
    3. Ferriferous, Safflorite.
83A. **Spathiopyrite** (Ap. II., p. 52), orthorhombic; sulph-arsenide of cobalt, iron and copper.
84. **Skutterudite,** $1.50; isometric; arsenide of cobalt.
85. **Cobaltite,** 5c. to $2.00; isometric; sulph-arsenide of cobalt.
86. **Gersdorffite,** 10c. to $1.50; isometric; sulph-arsenide of nickel.
87. **Ullmannite,** 25c. to $2.00; isometric; sulph-antimonide of nickel.
88. **Corynite,** isometric; sulph-arsen-antimonide of nickel.
89. **Laurite,** isometric; sulphide of osmium and ruthenium.
90. **Marcasite,** 5c. to $1.50; orthorhombic; sulphide of iron.
91. **Löllingite,** orthorhombic; arsenide of iron.
92. **Rammelsbergite,** orthorhombic; arsenide of nickel.
92A. **Wolfachite,** (Ap. I., p. 17); orthorhombic; sulph-arsen-antimonide of nickel.
93. **Leucopyrite,** 5c. to 50c.; orthorhombic; sesquiarsenide of iron.
    Var. Geyerite, between Löllingite and Leucopyrite.
93A. **Glaucopyrite,** (Ap. I., p. 6); orthorhombic; sulph-antimon-arsenide of iron and cobalt.
94. **Arsenopyrite,** 5c. to $1.50; orthorhombic; sulph-arsenide of iron.
    Var. Danaite (also Vermontite and Akontite), 4-10 p. c. cobalt.

94A. **Plinian,** monoclinic; comp. like arsenopyrite.
95. **Glaucodot,** 50c. to $2.50; orthorhombic; sulph-arsenide of cobalt and iron.
96. **Pacite,** orthorhombic; sulph-arsenide of iron.
97. **Alloclasite,** orthorhombic; sulph-arsenide of bismuth and cobalt.
98. **Sylvanite,** 50c. to $7.50; monoclinic; telluride of gold and silver.
98A. **Calaverite,** $2.50 to $10.00; massive; telluride of gold and silver.
99. **Nagyagite,** 50c. to $5.00; orthorhombic; sulpho-telluride of lead and gold.
100. **Covellite,** 10c. to $1.00: hexagonal; protosulphide of copper.
100A. **Melonite,** hexagonal; telluride of nickel.
101. **Chalcostibite,** orthorhombic; sulph-antimonide of copper.
102. **Emplectite,** 25c. to $2.50; orthorhombic; sulphide of bismuth and copper.
103. **Chiviatite,** massive; sulphide of bismuth, copper and lead.
104. **Berthierite,** 25c. to $2.00; massive; sulph-antimonide of iron.
105. **Sartorite,** orthorhombic; sulph-arsenide of lead.
106. **Zinkenite,** 25c. to $2.50; orthorhombic; sulph-antimonide of lead.
107. **Jordanite,** $1.00 to $10.00; orthorhombic; sulph-arsenide of lead.
108. **Miargyrite,** 50c. to $5.00; monoclinic; sulph-antimonide of silver.
109. **Plagionite,** 25c. to $2.50; monoclinic; sulph-antimonide of lead.
110. **Binnite,** 50c. to $5.00; isometric; sulph-arsenide of copper.
111. **Brongniardite,** isometric: sulph-antimonide of silver and lead.
112. **Jamesonite,** 10c. to $2.50; orthorhombic; sulph-antimonide of lead.
112A. **Cosalite,** 50c. to $2.50; massive; sulphide of bismuth and lead.
112B. **Schirmerite,** (Ap. II., p. 50); massive; sulphide of lead, bismuth and silver.
113. **Dufrenoysite,** 50c. to $5.00; orthorhombic; sulph-arsenide of lead.
113A. **Diaphorite** (Ap. I., p. 4), $1.00 to $3.50; orthorhombic; sulph-antimonide of lead and silver.
114. **Freieslebenite,** 50c. to $7.50; monoclinic; sulph-antimonide of lead and silver.
115. **Pyrostilpnite,** $1.00 to $5.00; monoclinic; sulph-antimonide of silver.
116. **Rittingerite,** $5.00 to $10.00; monoclinic; selenide of silver. (?)
117. **Pyrargyrite,** 25c. to $5.00; rhombohedral; sulph-antimonide of silver.
118. **Proustite,** 25c. to $10.00; rhombohedral; sulph-arsenide of silver.
119. **Bournonite,** 10c. to $2.50; orthorhombic; sulph-antimonide of lead and [copper.
120. **Stylotypite,** orthorhombic; sulph-antimonide of silver, copper and iron.
121. **Wittichenite,** orthorhombic; sulphide of bismuth and copper.
121A. **Klaprotholite,** (Ap. 1., p. 8); orthorhombic; sulphide of bismuth and copper.
122. **Boulangerite,** 25c. to $2.00; massive; sulph-antimonide of lead.
122A. **Epiboulangerite,** (Ap. I., p. 5); orthorhombic; sulph-antimonide of lead.
123. **Kobellite,** 25c. to $1.50; massive; sulph-antimonide of lead and bismuth.
124. **Aikinite,** orthorhombic; sulphide of lead, bismuth and copper.
125. **Tetrahedrite,** 10c. to $5.00; isometric; sulph-antimonide of copper.
    Var. 1. Freibergite; 10c. to $1.50; contains silver.
    2. Schwatzite, Spaniolite and Hermesite contain mercury.
    3. Platiniferous; contains platinum.
126. **Polytelite,** massive; sulph-antimonide of silver and lead.
127. **Tennantite,** 10c. to $2.50; isometric; sulph-arsenide of copper and iron.
127A. **Julianite,** (Ap. I., p. 8); isometric; sulph-arsenide of copper.
128. **Meneghinite,** monoclinic; sulph-antimonide of lead.
129. **Geocronite,** orthorhombic; sulph-antimonide of lead.
130. **Stephanite,** 25c. to $5.00: orthorhombic; sulph-antimonide of silver.
131. **Polybasite,** 10c. to $5.00; orthorhombic; sulph-antimonide of silver.
132. **Enargite,** 10c. to $2.00; orthorhombic; sulph-arsenide of copper.
132A. **Epigenite,** (Ap. I., p. 5); orthorhombic; sulph-arsenide of copper and iron.
132B. **Famatinite,** (Ap. II., p. 20); orthorhombic; sulph-antimon-arsenide of copper.
133. **Xanthoconite,** rhombohedral; sulph-arsenide of silver.
134. **Clayite,** isometric; sulph-arsen-antimonide of lead and copper. (?)
135. **Bolivianite,** orthorhombic; sulph-antimonide of silver.

III. COMPOUNDS OF CHLORINE, BROMINE, IODINE.

136. **Calomel,** 25c. to $2.00; tetragonal; chloride of mercury.
137. **Sylvite,** 25c. to $2.00; isometric; chloride of potassium.
138. **Halite,** 5c. to $1.00; isometric; chloride of sodium.
139. **Sal Ammoniac,** 10c. to $2.00; isometric; chloride of ammonium.
140. **Cerargyrite,** 10c. to $2.50; isometric; chloride of silver.
141. **Embolite,** 10c. to $2.50; isometric; chloro-bromide of silver.
142. **Bromyrite,** isometric; bromide of silver.
143. **Iodyrite,** hexagonal; iodide of silver.
144. **Coccinite,** in rhombic pyramids; iodide of mercury. (?)
144A. **Bordosite,** (Ap. II., p. 8); chloride of silver and mercury.
145. **Cotunnite,** orthorhombic; chloride of lead.
146. **Molysite,** massive; chloride of iron.
146A. **Nantokite,** (Ap. I., p. 11., and II., p. 40); isometric; chloride of copper.
147. **Carnallite,** 10c. to $1.00; massive; hydrous chloride of magnesium and potassium.
148. **Tachhydrite,** 10c. to $1.00; massive; hydrous chloride of calcium and magnesium.
148A. **Erythrosiderite,** (Ap. II., p. 19); orthorhombic; hydrous chloride of potassium and iron.
149. **Kremersite,** isometric; hydrous chloride of potassium, ammonium and iron.
150. **Matlockite,** $1.00 to $10.00; tetragonal; oxy-chloride of lead.
151. **Mendipite,** 10c. to $2.00; orthorhombic; oxy-chloride of lead.
152. **Schwartzembergite,** $1.00 to $5.00; isometric; oxy-chloride and iodide of lead.
153. **Atacamite,** 10c. to $2.50; orthorhombic; hydrous oxy-chloride of copper.
153A. **Tallingite,** $1.00; massive; hydrous oxy-chloride of copper.
154. **Percylite,** $1.00 to $5.00; isometric; hydrous oxy-chloride of copper and lead.
155. Chloride of Magnesium.
156. **Scacchite,** (Ap. II., p. 50); chloride of manganese.
157. Iodide of zinc.
158. Bromide of zinc.

IV. FLUORINE COMPOUNDS.

159. **Fluorite,** 5c. to $25.00; isometric; fluoride of calcium.
    Var. 1. Ratofkite, earthy, lavender blue, from Russia.
    2. Chlorophane; 10c. to $1.00; shows a green phosphorescence.
160. **Yttrocerite,** 10c. to $1.00; massive; hydrous fluoride of calcium, yttrium and cerium.
161. **Fluocerite,** hexagonal; fluoride of cerium.
162. **Fluocerine,** isometric (?); hydrous oxy-fluoride of cerium.
163. **Fluellite,** orthorhombic; fluoride of aluminum.
163A. **Ralstonite,** (Ap. I., p. 18); isometric; hydrous fluoride of aluminum, magnesium, sodium and calcium.
163B. **Sellaite,** (Ap. I., p. 14); tetragonal; fluoride of magnesium.
164. **Cryolite,** 5c. to $2.50; triclinic; fluoride of aluminum and sodium.
165. **Arksutite,** massive; fluoride of aluminum, sodium and calcium.
166. **Chiolite,** tetragonal; fluoride of aluminum and sodium.
167. **Chodneffite,** tetragonal; fluoride of aluminum and sodium.
168. **Pachnolite,** 10c. to $1.00; monoclinic; hydrous fluoride of aluminum, calcium and sodium.
169. **Thomsenolite,** 25c. to $1.00; monoclinic; hydrous fluoride of aluminum, calcium and sodium.
169A. **Hagemannite,** 25c. to $1.00; near Thomsenolite.
170. **Gearksutite,** 10c. to $1.00; massive; hydrous fluoride of aluminum and calcium.
171. **Prosopite,** monoclinic; hydrous fluoride of aluminum, calcium and silicon.

V. OXYGEN COMPOUNDS.

I. Oxides, or Binary Oxygen Compounds.

I. Oxides of Elements of Gold, Iron and Tin Groups.

172. **Cuprite,** 5c. to $5.00 ; isometric ; protoxide of copper.
Var. Chalcotrichite; 25c. to $2.50.
173. **Periclasite,** isometric ; protoxide of magnesium and iron.
174. **Bunsenite,** isometric; protoxide of nickel.
175. **Water,** hexagonal; protoxide of hydrogen.
176. **Zincite,** 5c. to $2.50; hexagonal; protoxide of zinc.
177. **Massicot,** orthorhombic ; protoxide of lead.
178. **Melaconite,** 10c. to $1.00 ; isometric; protoxide of copper.
178A. **Delafossite,** (Ap. II., p. 16) ; massive ; oxide of copper and iron. (?)
179. **Corundum,** 5c. to $5.00 ; rhombohedral; sesquioxide of aluminum.
Var. 1. Sapphire; 10c. to $5.00 ; the finely colored, transparent to translucent, useful as gems. Ruby is the red sub-variety, 10c. to $2.50.
2. Emery ; 5c. to 50c.; granular, contains magnetite or hematite.
180. **Hematite,** 5c. to $2.50 ; rhombohedral ; sesquioxide of iron.
Superb Elba and Swiss specimens always in stock. (See also page 58)
180A. **Martite,** 5c. to 50c. ; isometric; sesquioxide of iron.
181. **Menaccanite,** 5c. to $1.00 ; rhombohedral; sesquioxide of iron and titanium.
181A. **Iserite,** 10c. to 50c. ; isometric menaccanite.
182. **Perofskite,** 5c. to $2.00; isometric; sesquioxide of titanium and calcium. (See page 29.)
183. **Spinel,** 5c. to $2.50 ; isometric; oxide of magnesium and aluminum.
184. **Hercynite,** isometric ; oxide of aluminum and iron.
185. **Gahnite,** 10c. to $2.50 ; isometric; oxide of zinc and aluminum.
Var. 1. Automolite, 25c. to $2.50; zinc Gahnite.
2. Dysluite, 10c. to $2.50 ; zinc-manganese-iron Gahnite.
3. Kreittonnite ; zinc-iron Gahnite.
185A. **Dimagnetite,** orthorhombic; a magnetite pseudomorph. (?)
186. **Magnetite,** 5c. to $2.00 ; isometric; sesquioxide and protoxide of iron. Lodestone, 10c, to $1.00, is the strongly magnetic variety.
187. **Magnesioferrite,** isometric; oxide of iron and magnesium.
188. **Franklinite,** 5c. to $5.00 ; isometric; oxide of iron, manganese and zinc.
188A. **Jacobsite,** (Ap. I., p. 8) ; 25c. to $1.00 ; isometric ; oxide of iron, manganese and magnesium.
189. **Chromite,** 5c. to 50c.; isometric; oxide of chromium and iron.
190. **Uraninite,** 25c. to $2.50; isometric; oxide of uranium.
191. **Chrysoberyl,** 25c. to $25.00; orthorhombic; oxide of beryllium and aluminum.
Var. Alexandrite, 50c. to $25.00; colored green by chrome.
192. **Cassiterite,** 5c. to $2.50; tetragonal; oxide of tin.
Var. Stream tin and wood tin, botryoidal or reniform; 5c. to $1.00.
192A. **Ainalite,** a cassiterite containing nearly 9 p. c. tantalic oxide.
193. **Rutile,** 5c. to $10.00; tetragonal; oxide of titanium.
We have a fine stock of highly modified N. C. crystals at 10c. to 50c; also some large crystals from Graves Mt., Ga., at $1.50 to $20.00. See also Ark.
194. **Octahedrite,** 25c. to $5.00; tetragonal; oxide of titanium. [Rutiles, p. 29.]
195. **Hausmannite,** 10c. to $1.00; tetragonal: protoxide and sesquioxide of manganese.
196. **Braunite,** 25c. to $1.50; tetragonal; sesquioxide of manganese.
197. **Minium,** 25c. to $5.00; massive; oxide of lead.
198. **Brookite,** 5c. to $5.00; orthorhombic; oxide of titanium. [See page 29.]
198A. **Eumanite,** near Brookite.
199. **Pyrolusite,** 5c. to $2.00; orthorhombic; binoxide of manganese.
Var. Polianite, now regarded as a distinct tetragonal species (*A. J. S.*, March, 1888.)
200. **Crednerite,** monoclinic; oxide of copper and manganese.
201. **Plattnerite,** hexagonal; binoxide of lead.
201A. **Vanadic Ochre,** massive; sesquioxide of vanadium.
202. **Turgite,** 10c. to $1.00; massive; hydrated sesquioxide of iron.
203. **Diaspore,** 25c. to $2.50: orthorhombic: hydrated sesquioxide of aluminum.

204. **Göthite,** 5c. to $2.00; orthorhombic; hydrated sesquioxide of iron.
Var. 1. Sammetblende, Przibramite, Needle-Ironstone, acicular crystals, often radiately grouped; 25c. to $1.00.
2. Onegite, or Fullonite, acicular Göthite penetrating quartz.
3. Lepidocrocite; 10c. to $1.00; scaly-fibrous or feathery-columnar.
205. **Manganite,** 10c. to $2.50; orthorhombic; hydrated sesquioxide of manganese.
206. **Limonite,** 5c. to 50c; massive; hydrated sesquioxide of iron.
207. **Xanthosiderite,** 10c. to 50c.; massive; hydrated sesquioxide of iron.
208. **Beauxite,** 5c. to 50c.; massive; hydrated sesquioxide of aluminum and iron.
209. **Eliasite,** massive; hydrous oxide of uranium, iron and lead.
210. **Brucite,** 10c. to $5.00; rhombohedral; hydrous oxide of magnesium.
Var. Nemalite; fibrous; 10c. to $1.00.
211. **Pyrochroïte,** massive; hydrous oxide of magnesium.
212. **Gibbsite,** 5c. to 50c.; hexagonal; hydrous oxide of aluminum.
213. **Limnite,** massive; hydrous oxide of iron.
214. **Hydrotalcite,** hexagonal; hydrous oxide of aluminum and magnesium.
Var. Houghite; 10c. to 50c.
214A. **Namaqualite,** (Ap. I., p. 11); massive; hydrous oxide of copper, aluminum, magnesium, etc.
215. **Pyroaurite,** hexagonal; hydrous oxide of iron and magnesium.
216. **Gummite,** 25c. to $5.00; amorphous; hydrous oxide of uranium.
217. **Psilomelane,** 5c. to 50c.; massive; hydrous oxide of manganese and barium.
218. **Wad,** 5c. to $1.00; massive; hydrous oxide of manganese.
Var. 1. Manganesian, Bog Manganese; 5c. to 50c.
2. Cobaltiferous, Asbolite, 10c. to 50c.
3. Cupriferous, Lampadite; 10c. to 50c.
4. Containing Lithium, Lithiophorite; 25c. to $1.00.
218E. **Rabdionite,** (Ap. I., p. 13); massive; hydrous oxide of iron, manganese, copper and cobalt.

II. OXIDES OF ELEMENTS OF ARSENIC AND SULPHUR GROUP.

219. **Arsenolite,** isometric; sesquioxide of arsenic.
220. **Senarmontite,** 25c. to $2.00; isometric; sesquioxide of antimony.
221. **Valentinite,** 25c. to $2.00; orthorhombic; sesquioxide of antimony.
221A. **Claudetite,** orthorhombic; sesquioxide of arsenic.
222. **Bismite,** massive; sesquioxide of bismuth.
223. **Karelinite,** massive; protoxide and sulphide of bismuth.
224. **Molybdite,** 10c. to 50c.; orthorhombic; sesquioxide of molybdenum.
224A. **Ilsemannite,** (Ap. I., p. 7); massive; molybdate of molybdenum.
225. **Tungstite,** massive; oxide of tungsten.
225A. **Meymacite,** (Ap. II., p. 38); hydrous oxide of tungsten.
226. **Kermesite,** 25c. to $3.50; monoclinic; oxide and sulphide of antimony.
227. **Cervantite,** 10c. to $1.00; orthorhombic; binoxide of antimony.
228. **Stibiconite,** massive; hydrous oxide of antimony.
Var. 1. Partzite, 10c. to $1.00.
2. Stetefeldtite. 10c. to $1 00.
229. **Volgerite,** massive: hydrous oxide of antimony.
230. **Tellurite,** 50c. to $2.50; orthorhombic; oxide of tellurium.
230A. **Tantalic Ochre,** massive; hydrous oxide of tantalum.

III. OXIDES OF ELEMENTS OF CARBON-SILICON GROUP.

231. **Quartz,** 5c. to $10.00; rhombohedral; binoxide of silicon.
A. Vitreous Varieties:
1. Rock Crystal; (*a*) Regular Crystals, 5c. to $10.00; (*b*) Drusy, 5c. to $2.00.
2. Asteriated. 3. Amethyst; 5c. to $10.00. 4. Rose; 5c. to $1.00.
5. Yellow. 6. Smoky, Cairngorm Stone, Smoky Topaz; 5c. to $10.00.
7. Milky; 5c. to 25c.; Greasy; 10c. to 50c.
8. Siderite, or Sapphire Quartz.

9. Sagenitic; (*a*) Rutilated, 10c. to $5.00; (*b*) Enclosing black tourmaline, 25c. to $2.50; (*c*) Enclosing Göthite, 25c. to $2.50; (*d*) Enclosing Stibnite, 50c. to $2.50; (*e*) Enclosing Asbestos, 25c. to $2.50; (*f*) Enclosing Actinolite or Byssolite, 5c. to $2.50; (*g*) Enclosing Hornblende, 10c. to $2.50; (*h*) Enclosing Epidote, 25c. to $2.50. Other rare enclosures are in stock.
10. Cat's Eye, 25c. to $2.50. 11. Aventurine, 25c. to $2.50.
12. Impure; (*a*) Ferruginous, 5c. to $1.00; (*b*) Chloritic, 5c. to $1.00; (*c*) Actinolitic; (*d*) Micaceous; (*e*) Arenaceous.
13. Containing Liquids; 50c. to $5.00.

B. Cryptocrystalline Varieties:
1. Chalcedony; 5c. to $2.50; enclosing water, Uraguay, $2.50 to $10.00
2. Carnelian; 10c. to $1.00. 3. Chrysoprase; 10c. to $2.00.
4. Prase; 10c. to $1.00. 5. Plasma; Heliotrope or Blood Stone, 25c. to $2.50. 6. Agate; 5c. to $5.00. We have a very large stock of all kinds polished. (*a*) Banded, 5c. to $5.00; (*b*) Clouded, 10c. to $1.00; (*c*) Moss, 5c. to $1.00.
7. Onyx; 10c. to $1.00. 8. Sardonyx; 10c. to $1.00.
9. Agate Jasper. 10. Silicious Sinter. 11. Flint; 5c. to 50c.
12. Hornstone or Chert; 5c. to 50c. 13. Basanite, Lydian Stone, or Touchstone; 10c. to 50c. 14. Jasper; 5c. to $1.00.

C. Other Varieties.
1. Granular Quartz; 5c. to 25c. 2. Quartzose Sandstone.
3. Quartz-Conglomerate. 4. Itacolumite or Flexible Sandstone; 5c. to $2.50. 5. Buhrstone. 6. Pseudomorphous Quartz; (*a*) Tabular; 5c. to 50c.; (*b*) Haytorite, pseudo. Datolite; (*c*) Beckite, pseudo. Coral; 25c. to $1.00; (*d*) Babel Quartz; 50c. to $1.50; (*e*) Silicified Shells; (*f*) Silicified Wood (including Jasperized Wood), 5c. to $1.00; fine polished specimens, $1.00 to $35.00. Many other interesting pseudomorphs are in stock, such as after Calcite, Glauberite, Thenardite, Gypsum, Fluorite.

231A. **Tridymite,** 10c. to $1.50; triclinic; binoxide of silicon.
231B. **Asmanite,** (Ap. II., p. 5); orthorhombic; meteoric binoxide of silicon.
232. **Opal,** 5c. to $5.00; massive; binoxide of silicon.
Var. 1. Precious Opal; 25c. to $5.00. 2. Fire-Opal; 10c. to $2.00.
3. Girasol. 4. Common Opal; 5c. to $1.00; includes Resin Opal, Semi-Opal; 10c. to $1.00; Hydrophane: 25c. to $1.00; Forcherite; 25c. to $1.00.
5. Cacholong; 10c. to $1.00. 6. Opal-Agate; 25c. to $2.50.
7. Menilite; 10c. to 50c. 8. Jasp-Opal.
9. Wood-Opal; 10c. to $2.00.
10. Hyalite, Muller's Glass; 25c. to $5 00.
11. Fiorite or Silicious Sinter; (*a*) Pearl Sinter; (*b*) Michaelite; (*c*) Geyserite; 5c. to $1.00.
12. Float-stone. 13. Tripolite; 5c. to 50c.; (*a*) Infusorial Earth; (*b*) Randanite; (*c*) Tripoli Slate; (*d*) Alumocalcite.

233. **Jenzschite,** massive; binoxide of silicon.

II. TERNARY OXYGEN COMPOUNDS.

1. SILICATES.

A. ANHYDROUS SILICATES.

I. BISILICATES.

234. **Enstatite,** 10c. to $2.50; orthorhombic; silicate of iron and magnesium.
Var. Bronzite; 10c. to $1.00.
235. **Hypersthene,** 10c. to $2.00; orthorhombic; silicate of iron and magnesium.
236. **Diaclasite,** orthorhombic; silicate of magnesium, iron and calcium.
237. **Wollastonite,** 5c. to $1.00; monoclinic; silicate of calcium.
237A. **Edelforsite,** massive; silicate of calcium.

238. **Pyroxene**, 5c. to $5.00; monoclinic; bisilicate of protoxide bases.
Var. 1. Lime-magnesia Pyroxene, Malacolite or Diopside. (*a*) Malacolite; 5c. to 50c; (*b*) Alalite; (*c*) Traversellite; (*d*) Mussite; 10c. to 50c; (*e*) White Coccolite; 5c. to 50c.
2. Lime-magnesia-iron Pyroxene, Sahlite. (*a*) Sahlite; 10c. to 50c.; (*b*) Baikalite; (*c*) Protheite; (*d*) Funkite; (*e*) Diallage.
3. Iron-lime Pyroxene, Hedenbergite.
4. Lime-magnesia-manganese Pyroxene, Schefferite.
5. Lime-iron-manganese Pyroxene.
6. Lime-iron-manganese-zinc Pyroxene; Jeffersonite; 10c. to $2.50.
7. Aluminous-lime-magnesia Pyroxene, Leucaugite.
8. Aluminous-lime-magnesia-iron Pyroxene, Fassaite, Augite. (*a*) Fassaite; 25c. to $1.00; (*b*) Augite; 5c. to $2.50; (*c*) Alluminous Diallage.
9. Aluminous-iron-lime Pyroxene, Hudsonite.
10. Asbestus, (in part only). See also Amphibole.
11. Breislakite; 10c. to $1.00. 12. Lavroffite.
Altered Pyroxenes: 13. Hydrous Augite. 14. Picrophyll. 15. Pyrallolite. 16. Schiller Spar. 17. Traversellite. 18. Pitkarandite. 19. Strakonitzite. 20. Monrandite. 21. Hydrous Diallages. 22. Uralite.

238A. **Omphacite**, monoclinic; —a variety of pyroxene.
238B. **Violan**, 25c. to $1.50; monoclinic; silicate of calcium, magnesium, aluminum, iron, manganese and sodium.
239. **Ægirite**, 5c. to $5.00; monoclinic; silicate of iron, calcium and sodium.
240. **Acmite**, 50c. to $2.50; monoclinic; silicate of iron and sodium.
241. **Rhodonite**, 5c. to $10.00; triclinic; silicate of manganese.
Var. 1. Bustamite, 25c. to $2.00; contains calcium.
2. Fowlerite, 5c. to $10.00; contains zinc.
242. **Babingtonite**, 25c. to $2.50; triclinic; silicate of iron, manganese and calcium.
243. **Spodumene**, 5c. to $1.00; monoclinic; silicate of aluminum and lithium.
Var. Hiddenite, 50c. to $10.00; (Ap. III, p. 112).
244. **Petalite**, 10c. to $1.50; monoclinic; silicate of aluminum, lithium and sodium.
Var. Castorite; 50c. to $1.50.
245. **Kupfferite**, monoclinic; silicate of magnesium.
246. **Anthophyllite**, 10c. to $1.00; orthorhombic; silicate of magnesium and iron.
246A. **Piddingtonite**, near Anthophyllite.
247. **Amphibole**, 5c. to $2.50; monoclinic; bisilicate of protoxide bases.
Var. 1. Magnesia-lime Amphibole, Tremolite, 5c. to $1.00.
1a. Nephrite or Jade, near Tremolite, 10c. to $10.00.
1b. Hexagonite, 10c. to 75c.
2. Magnesia-lime-iron Amphibole, Actinolite, 5c. to $1.00.
3. Magnesia-iron Amphibole, Antholite.
4. Magnesia-lime-manganese Amphibole, Richterite.
5. Iron-magnesia Amphibole, Cummingtonite.
6. Iron-manganese Amphibole, Dannemorite.
7. Iron Amphibole, Grünerite.
8. Asbestus, 5c. to $1.00; includes (a) Amianthus, 10c. to $1.00; (b) Mountain Leather, 25c. to $1.00; (c) Mountain Cork, 25c. to $1.00; (d) Mountain Wood, 25c. to $1.00; (e) Byssolite, 5c. to $1.00.
9. Aluminous magnesia-lime Amphibole; (a) Edenite, 5c. to 50c.; (b) Smaragdite, 5c. to 50c.
10. Aluminous magnesia-lime-iron Amphibole; (a) Pargasite, 10c. to 50c.; (b) Hornblende, 5c. to $2.50.
11. Aluminous iron-lime Amphibole, Noralite.
12. Aluminous iron-manganese Amphibole, Gamsigradite.
13. Hydrous Anthophyllite, 5c. to 50c., is an altered tremolite.

247A. **Waldheimite**, near amphibole, but contains much soda.
247B. **Kokscharoffite**, near amphibole.
247C. **Schefferite**, near amphibole.
247D. **Nigrescite** (Ap. I., p. 12); massive; hydrous silicate of magnesium, iron [and aluminum.
248. **Arfvedsonite**, 10c. to $2.00; monoclinic (?); silicate of iron and sodium.

249. **Crocidolite,** 10c. to $1.00 ; massive ; silicate of iron, magnesium and sodium ; commonly occurs altered to quartz and popularly known as "Tiger-Eye." Polished specimens, 10c. to $2.00. [magnesium.
250. **Wichtisite;** massive; silicate of aluminum, iron, calcium, sodium and
251 **Glaucophane;** monoclinic; silicate of aluminum, iron, magnesium, calcium and sodium.
252. **Sordavalite;** massive; silicate of aluminum, iron and magnesium. [sodium.
253. **Tachylyte;** massive; silicate of aluminum, iron, calcium, magnesium and
254. **Beryl,** 5c. to $10.00; hexagonal, silicate of aluminum and beryllium.
Var. 1. Emerald, 50c. to $10.00.
2. Aquamarine, 10c. to $5.00. (See page 46.)
255. **Eudialyte,** 10c. to $5.00 ; rhombohedral ; silicate of sodium, calcium, iron
Var. Eucolite, 25c. to $1.50. (See page 29.) [and zirconium.
256. **Pollucite,** 50c. to $1.50 ; isometric ; silicate of aluminum and caesium.

II.—UNISILICATES.

257. **Forsterite;** orthorhombic ; silicate of magnesium.
Var. Boltonite; 5c. to 50c.
258. **Monticellite;** orthorhombic ; silicate of calcium and magnesium.
259. **Chrysolite;** 10c. to $2.50; orthorhombic ; silicate of magnesium and iron.
Var. 1. Precious, 25c. to $2.50. 2. Common, olivene, 10c. to $1.00
259A. **Hortonolite** (Ap. I., p. 7) ; orthorhombic ; silicate of iron, magnesium and manganese.
260. **Fayalite;** massive ; silicate of iron.
261. **Iron-Manganese Chrysolite.**
261A. **Roepperite** (Ap. I., p. 13), orthorhombic ; silicate of iron, manganese and zinc.
262. **Tephroite;** 10c. to $1.00; orthorhombic ; silicate of manganese.
262A. **Hydrotephroite;** hydrous silicate of manganese and magnesium.
263. **Knebelite;** massive; silicate of manganese and iron. [and sodium.
264. **Leucophanite;** 25c. to $2.00; monoclinic; fluo-silicate of beryllium, calcium
265. **Wöhlerite;** 25c. to $3.50; monoclinic; silico-columbate of zirconium,
266. **Willemite;** 5c. to $2.50; rhombohedral; silicate of zinc. [calcium, etc.
Var. Troostite; 5c. to $2.50.
267. **Phenacite;** 10c. to $10.00; rhombohedral; silicate of beryllium
See page 47. [calcium and sodium,
268. **Meliphanite;** 25c. to $2.50; tetragonal or hexagonal; fluo-silicate of beryllium.
269. **Helvite;** 50c. to $3.00; isometric; silicate and sulphide of beryllium, manganese and iron. [and zinc.
270. **Danalite;** isometric; silicate and sulphide of beryllium, iron, manganese
271. **Garnet,** 5c. to $10.00; isometric; unisilicate of sesquioxide and protoxide bases.
Var. 1. Lime-alumina garnet, Grossularite. (*a*) Grossularite, 10c. to $1.50; (*b*) Essonite or cinnamon-stone, 10c. to $2.50; (*c*) Succinite; (*d*) Romanzovite.
2. Magnesia-alumina garnet, Pyrope, 5c. to 50c.
3. Iron-alumina garnet, Almandite, 5c. to $2.50.
4. Manganese-alumina garnet, Spessartite, 10c. to $3.50.
5. Lime-iron garnet, Andradite.
Sub-division 1—Simple lime-iron garnet. (*a*) Topazolite, 25c. to $2.50. (*b*) Colophonite, 10c. to $1.00. (*c*) Melanite, 10c. to $2.50. (*d*) Jelletite, 50c. to $5 00.
Sub-division 2—Manganesian lime-iron garnet. (*a*) Rothoffite, including also Allochroite and Polyadelphite, 5c. to $2.50. (*b*) Aplome, 50c. to $2.50.
Sub-division 3—Yttriferous lime-iron garnet, Yttergarnet.
6. Lime-magnesia-iron garnet, Bredbergite, 50c. to $2.50.
7. Lime-chrome garnet, Ouvarovite. 25c. to $10.00.
272. **Zircon,** 5c. to $10.00 ; tetragonal ; silicate of zirconium.
272A. **Malacon,** 5c. to $1.00; probably an altered zircon.
272B. **Cyrtolite,** 25c. to $5.00; probably an altered zircon.
272C. **Tachyaphaltite ;** probably an altered zircon.
272D. **Oerstedite,** 25c. to $1.00 ; probably an altered zircon.

272E. **Auerbachite**; probably an altered zircon.
272F. **Bragite**; probably an altered zircon.
273. **Vesuvianite**, 5c. to $2.50.; tetragonal; silicate of aluminum, iron, calcium and magnesium.
Var. Cyprine, blue, 10c. to $2.00.
274. **Melilite**, 25c. to $2.00; tetragonal; silicate of aluminum, iron, calcium, magnesium, and sodium.
275. **Sphenoclase**, massive; silicate of calcium, aluminum, magnesium, iron and manganese.
276. **Epidote**, 5c. to $5.00.; monoclinic; silicate of aluminum, iron and calcium.
276A. **Koelbingite**; monoclinic; silicate of iron and calcium.
277. **Piedmontite**, 10c. to $1.00; monoclinic; silicate of aluminum, iron, manganese and calcium.
278. **Allanite**, 5c. to $1.00; monoclinic; silicate of aluminum, cerium, iron and calcium.
279. **Muromontite**; massive; silicate of yttrium, cerium, iron, &c.
279A. **Bodenite**; silicate of aluminum, iron, cerium, yttrium, &c.
279B. **Michaelsonite**; near Muromontite.
280. **Zoisite**, 5c. to $1.50; orthorhombic; silicate of aluminum, iron and calcium.
Var. Thulite, pink, 10c. to $1.50.
280A. **Jadeite**, massive; silicate of aluminum, calcium and sodium.
281. **Partschinite**, monoclinic; silicate of aluminum, iron and manganese.
282. **Gadolinite**, 25c. to $5.00; monoclinic; silicate of yttrium, cerium, iron, beryllium, &c.
283. **Mosandrite**, 50c. to $2.50; monoclinic; silicate of titanium, cerium, calcium, &c.
284. **Ilvaite**, 25c. to $2.50; orthorhombic; silicate of iron and calcium.
284A. **Ardennite**, (Ap. II., p. 4) orthorhombic; silicate of aluminum and manganese, containing arsenic and vanadium.
285. **Axinite**, 50c. to $10.00; triclinic; boro-silicate of aluminum, calcium and iron.
286. **Danburite**, 25c. to $2.00; orthorhombic; boro-silicate of calcium.
287. **Iolite**, 25c. to $2.50; orthorhombic; silicate of aluminum, iron and magnesium.
288. **Phlogopite**, 5c. to $1.00; monoclinic; fluo-silicate of aluminum, potassium and magnesium.
288A. **Aspidolite**, (Ap. I., p. 2) orthorhombic; a sodium phlogopite.
289. **Biotite**, 5c. to $1.00; monoclinic; silicate of iron, aluminum, potassium and magnesium.
290. **Lepidomelane**, 5c. to 50c.; hexagonal; silicate of aluminum, iron, potassium and magnesium.
290A. **Manganophyllite** (Ap. II. p. 37); hexagonal (?); silicate of aluminum, manganese, magnesium, &c.
291. **Annite**, near Lepidomelane.
292. **Astrophyllite**, 10c. to $1.00; orthorhombic; silicate of titanium, iron, manganese, magnesium, sodium, and aluminum.
293. **Muscovite**, 5c. to $1.00; monoclinic; silicate of aluminum and potassium.
Var. 1. Plumose Mica, 10c. to 50c. 2. Fuschite, 5c. to 50c.
3. Mariposite, 25c. to $1.00 (Ap. II., p. 37.)
294. **Lepidolite**, 5c. to $2.50; monoclinic; fluo-silicate of aluminum, potassium and lithium.
Var. Zinnwaldite, 25c. to $2.50.
295. **Cryophyllite**, orthorhombic; fluo-silicate of aluminum, potassium, iron and lithium.
296. **Sarcolite**, tetragonal; silicate of aluminum, calcium and sodium.
297. **Meionite**, 25c. to $2.00; tetragonal; silicate of aluminum, calcium and sodium.
298. **Paranthite**, tetragonal; silicate of aluminum and calcium.
299. **Wernerite**, 5c. to $2.50; tetragonal; silicate of aluminum, calcium and sodium.
Var. 1. Algerite, 50c. to $2.00; 2. Wilsonite, 25c. to $1.00.
300. **Ekebergite**, tetragonal; silicate of aluminum, calcium and sodium.
301. **Mizzonite**, tetragonal; silicate of aluminum, calcium and sodium.
302. **Dipyre**, 50c. to $2.00; tetragonal; silicate of aluminum, calcium and sodium.
303. **Marialite**, tetragonal; silicate of aluminum, calcium and sodium.
304. **Nephelite**, 5c. to $2.00; hexagonal; silicate of aluminum, sodium and potassium.
Var. Elaeolite; 5c. to 50c.
304A. **Cancrinite**, 5c. to $1.00; hexagonal; silico-carbonate of aluminum, calcium and sodium.
305. **Sodalite**, 10c. to $1.00; isometric; silicate and chloride of aluminum and sodium.
305A. **Microsommite**, (Ap. II., p. 39) orthorhombic; silicate and chloride of aluminum, sodium, calcium and potassium.
306. **Lapis Lazuli**, 10c. to $2.50; isometric; silicate of aluminum and calcium with sulphide of sodium.

307. **Haüynite,** isometric; silicate of aluminum and sodium with sulphate of cal-
308. **Nosite,** isometric; silicate and sulphate of aluminum and sodium. [cium.
309. **Leucite,** 10c. to $2.50; tetragonal; silicate of aluminum and potassium.
309A. **Maskelynite,** (Ap. II., p. 37); isometric; silicate of aluminum, calcium, sodium, and potassium.
310. **Anorthite,** 10c. to $1.00; triclinic; silicate of aluminum and calcium.
311. **Labradorite,** 5c. to $2.00; triclinic; silicate of aluminum, calcium and so-
312. **Andesite,** triclinic; silicate of aluminum, calcium and sodium. [dium.
313. **Hyalophane,** monoclinic; silicate of aluminum, potassium and barium.
314. **Oligoclase,** 5c. to $2.50; triclinic; silicate of aluminum, calcium and sodium.
Var. 1. Sunstone, 25c. to $1.50.
2. Moonstone (in part), 10c. to $1.50.
315. **Albite,** 5c. to $5.00; triclinic; silicate of aluminum and sodium.
Var. 1. Moonstone (in part), 10c. to $1.00. 2. Peristerite, 25c. to $2.00.
3. Pericline, 25c. to $2.00. 4. Cleavelandite, 5c. to 50c.
316. **Orthoclase,** 5c. to $5.00; monoclinic; silicate of aluminum and potassium.
Var. 1. Adularia, 25c. to $5.00. 2. Cassinite, 10c. to $1.00.
3. Sanidin, 25c. to $1.00. 4. Loxoclase, 25c. to $1.00.
5. Obsidian, 5c. to $1.00. 6. Pearlstone, 10c. to 50c.
7. Pitchstone, 10c. to 50c.

III.—SUBSILICATES.

319. **Chondrodite,** 10c. to $2.00; silicate of magnesium.
Des Cloizeaux has proved that the three types of "Chondrodite" are really three distinct species, as follows:
I. Humite; orthorhombic.
II. Chondrodite; monoclinic.
III. Clinohumite; monoclinic.
320. **Tourmaline,** 5c. to $10.00; rhombohedral; a boro-silicate of aluminum, with magnesium, iron, manganese or lithium.
Var. 1. Pink, Rubellite, 5c. to $10.00. 2. Blue, Indicolite, 10c. to $2.00. 3. Colorless, Achroite. 4. Brown, 5c. to $5.00. 5. Black, 5c. to $2.00. 6. Green, 10c. to $2.50. 7. Green, with pink center, 50c. to $5.00.
321. **Gehlenite,** 25c. to 2.00; tetragonal, silicate of aluminum, iron and calcium.
322. **Andalusite,** 10c. to $2.50; orthorhombic; silicate of aluminum.
Var. Chiastolite, 10c. to $1.00.
323. **Fibrolite,** 5c. to 50c.; monoclinic; silicate of aluminum.
323A. **Westanite** (Ap. I., p. 16), a hydrous Fibrolite.
324. **Cyanite,** 5c. to $1.00; triclinic; silicate of aluminum.
325. **Topaz,** 5c. to $20.00; orthorhombic; flus-silicate of aluminum. Our stock is rich in choice crystals—see pages 30 and 36.
326. **Euclase,** $5.00 to $20.00; monoclinic; silicate of aluminum and beryllium.
327. **Datolite,** 10c. to $2.50; monoclinic; boro-silicate of calcium.
328. **Guarinite,** orthorhombic; silicate of calcium and titanium.
329. **Titanite,** 5c. to $5.00; monoclinic; silicate of calcium and titanium.
330. **Grothite,** monoclinic; silicate of calcium, titanium, iron, manganese, &c.
331. **Keilhauite,** 25c. to $2.50; monoclinic; silicate of calcium, titanium, yttrium, aluminum and iron.
332. **Tscheffkinite,** massive; silicate of titanium, iron, cerium, &c. [nesium.
333. **Staurolite,** 5c. to 50c.; orthorhombic; silicate of aluminum, iron and mag-
334. **Schorlomite,** 10c. to $1.00; massive; silicate of titanium, iron and calcium.
335. **Sapphirine,** monoclinic; silicate of aluminum, magnesium and iron.
335A. **Trautwinite,** (Ap. II., p. 56); hexagonal; silicate of chromium, calcium and
336. **Eulytite,** 50c. to $5.00; isometric; silicate of bismuth. [iron.
337. **Atelestite,** monoclinic; arsenate of bismuth.
338. **Hypochlorite,** massive; quartz with bismutoferrite.
338A. **Isopyre,** massive; silicate of iron, calcium and aluminum.

B.—HYDROUS SILICATES.

I. GENERAL SECTION OF HYDROUS SILICATES.

339. **Pectolite,** 10c. to $2.00; monoclinic; hydrous silicate of calcium and sodium.
340. **Xonaltite,** massive; hydrous silicate of calcium.

840A. **Plombierite,** massive; hydrous silicate of calcium.
841. **Okenite,** orthorhombic; hydrous silicate of calcium.
841A. **Centrallassite,** massive; hydrous silicate of calcium.
841B. **Cyanolite,** massive; hydrous silicate of calcium.
842. **Gyrolite,** massive; hydrous silicate of calcium. [calcium.
843. **Laumontite,** 5c. to 50c.; monoclinic; hydrous silicate of aluminum and
844. **Catapleiite,** hexagonal; hydrous silicate of zirconium, sodium and calcium.
845. **Dioptase,** 50c. to $20.00; rhombohedral; hydrous silicate of copper.
846. **Chrysocolla,** 5c. to $2.50; massive; hydrous silicate of copper.
846A. **Resanite** (Ap. II., p. 48); massive; hydrous silicate of copper and iron.
847. **Alipite,** massive; hydrous silicate of nickel and magnesium.
848. **Conarite,** 50c. to $2.50; monoclinic (?); hydrous silicate of nickel.
849. **Picrosmine,** orthorhombic; hydrous silicate of magnesium.
849A. **Hydrosilicite,** massive; hydrous silicate of calcium, magnesium, &c.
850. **Spadaite,** massive; hydrous silicate of magnesium.
851. **Pyrallolite,**
852. **Picrophyll,**
853. **Traversellite,**
854. **Pitkarandite,**
855. **Strakonitzite,**
856. **Monradite,**

These are names of Pyroxene in different stages of alteration, between true Pyroxene and either Serpentine or Steatite.

857. **Neolite,** massive; hydrous silicate of magnesium and aluminum.
858. **Paligorskite,** massive; hydrous silicate of aluminum and magnesium.
859. **Xylotile,** 25c. to $1.00; massive; hydrous silicate of iron and magnesium.
860. **Anthosiderite,** massive; hydrous silicate of iron.
861. **Calamine,** 5c. to $3.50; orthorhombic; hydrous silicate of zinc.
861A. **Moresnetite,** hydrous silicate of zinc and aluminum.
862. **Villarsite,** orthorhombic; hydrous silicate of magnesium and iron.
863. **Prehnite,** 5c. to $2.50; orthorhombic; hydrous silicate of aluminum and
864. **Chlorastrolite,** 5c. to 50c.; massive; an impure Prehnite. [calcium.
865. **Tritomite,** isometric; hydrous silicate of cerium, lanthanum, &c.
866. **Thorite,** 25c. to $5.00; isometric; hydrous silicate of thorium.
Var. Orangite, $1.00 to $5.00.
867. **Cerite,** 10c. to $1.50; orthorhombic; hydrous silicate of cerium, lanthanum, and didymium. [calcium, etc.
868. **Erdmannite,** massive; hydrous silicate of cerium, thorium, beryllium,
869. **Pyrosmalite,** 50c. to $3.50; hexagonal; hydrous silicate and chloride of iron and manganese. [potassium.
870. **Apophyllite,** 5c. to $5.00; tetragonal; hydrous silicate of calcium and
870A. **Chalcomorphite,** (Ap. II., p. 11); hexagonal; hydrous silicate of calcium and aluminum.
871. **Edingtonite,** tetragonal; hydrous silicate of aluminum and barium.
872. **Gismondite,** 50c. to $5.00; orthorhombic; hydrous silicate of calcium and aluminum. [manganese and iron.
873. **Carpholite,** 50c. to $2.50; orthorhombic; hydrous silicate of aluminum,
874. **Allophane,** 25c. to $1.00; massive; hydrous silicate of aluminum.
875. **Collyrite,** massive; hydrous silicate of aluminum.
875A. **Dillnite,** massive; hydrous silicate of aluminum.
876. **Schrötterite,** massive; hydrous silicate of aluminum.
876A. **Scarbroite,** massive; hydrous silicate of aluminum.
876B. **Uranophane,** orthorhombic (?); hydrous silicate of uranium, calcium, etc.

II.—ZEOLITE SECTION.

877. **Thomsonite,** 5c. to $1.50; orthorhombic; hydrous silicate of aluminum, calcium, and sodium. [sodium, &c.
877A. **Rauite** (Ap. II., p. 47), massive; hydrous silicate of aluminum, calcium,
878. **Natrolite,** 10c. to $2.00; orthorhombic; hydrous silicate of aluminum and sodium. [calcium.
879. **Scolecite,** 25c. to $2.50; monoclinic; hydrous silicate of aluminum and
880. **Ellagite,** a ferriferous natrolite. [and sodium.
881. **Mesolite,** 10c. to $2.00; monoclinic; hydrous silicate of aluminum, calcium

382. **Levynite,** 50c. to $2.50; rhombohedral; hydrous silicate of aluminum and calcium.
383. **Analcite,** 10c. to $2.50; isometric; hydrous silicate of aluminum and sodium.
384. **Eudnophite,** orthorhombic; hydrous silicate of aluminum and sodium.
385. **Faujasite,** 25c. to $2.00; isometric; hydrous silicate of aluminum, calcium and sodium.
386. **Chabazite,** 5c. to $3.50; rhombohedral; hydrous silicate of aluminum, calcium and potassium.
Var. 1. Acadialite, 5c. to $2.00.
2. Phacolite, 25c. to $3.50.
3. Haydenite, 10c. to $1.50.
387. **Gmelinite,** 25c. to $3.50; rhombohedral, hydrous silicate of aluminum, calcium and sodium.
388. **Herschelite,** 50c. to $2.50; orthorhombic; hydrous silicate of aluminum, sodium and potassium.
388A. **Seebachite** (Ap. II., p. 50), 50c. to $2.50; orthorhombic; hydrous silicate of aluminum, sodium and calcium.
389. **Phillipsite,** 25c. to $2.50, monoclinic; hydrous silicate of aluminum, calcium and potassium.
390. **Harmotome,** 25c. to $2.50; monoclinic; hydrous silicate of aluminum and barium.
391. **Hypostilbite,** massive; hydrous silicate of aluminum and calcium.
392. **Stilbite,** 5c. to $2.50; orthorhombic; hydrous silicate of aluminum and calcium.
392A. **Foresite** (Ap. II., p. 22); orthorhombic; hydrous silicate of aluminum and calcium.
393. **Epistilbite,** 50c. to $3.50; monoclinic; hydrous silicate of aluminum, calcium and sodium.
394. **Heulandite,** 5c. to $2.00; monoclinic; hydrous silicate of aluminum and calcium.
395. **Brewsterite,** monoclinic; hydrous silicate of aluminum, barium and strontium.
396. **Mordenite,** massive; hydrous silicate of aluminum, calcium and sodium.
397. **Sloanite,** orthorhombic; hydrous silicate of aluminum and calcium.
398. **Saspachite,** massive; hydrous silicate of aluminum, calcium, potassium and magnesium.

III.—MARGAROPHYLLITE SECTION.

399. **Talc,** 5c. to 50c.; orthorhombic; hydrous silicate of magnesium.
400. **Pyrophyllite,** 5c. to $2.00; orthorhombic; hydrous silicate of aluminum.
401. **Pihlite,** massive; hydrous silicate of aluminum, &c.
402. **Sepiolite,** 5c. to 50c.; massive; hydrous silicate of magnesium.
403. **Aphrodite,** massive; hydrous silicate of magnesium.
404. **Cimolite,** massive; hydrous silicate of aluminum.
404A. **Sphragidite,** massive; hydrous silicate of aluminum, iron, &c.
404B. **Ehrenbergite,** massive; hydrous silicate of aluminum, iron, &c.
404C. **Anauxite,** massive; hydrous silicate of aluminum, iron, &c.
404D. **Portite,** orthorhombic; hydrous silicate of aluminum, magnesium, &c.
404E. **Nefedieffite** (Ap. II. p. 41); massive; hydrous silicate of aluminum and magnesium.
405. **Smectite,** massive; hydrous silicate of aluminum, &c.
406. **Montmorillonite,** 5c. to 50c.; massive; hydrous silicate of aluminum.
406A. **Razoumoffskin,** 25c. to $1.00; massive; hydrous silicate of aluminum.
407. **Stilpnomelane,** 10c. to $2.50; massive; hydrous silicate of iron and aluminum.
Var. Chalcodite; 10c. to $2.50.
408. **Chloropal,** massive; hydrous silicate of iron.
409. **Glauconite,** 10c. to 50c.; massive; hydrous silicate of iron, potassium, &c.
410. **Celadonite,** 25c. to $1.00; massive; hydrous silicate of iron and potassium.
411. **Serpentine,** 5c. to $1.00: massive; hydrous silicate of magnesium.
Var. 1. (a) Precious, 10c. to $1.00; (b) Common, 5c. to 25c. 2. Retinalite.
3. Porcellophite, 10. to 50c. 4. Bowenite, 10c. to 50c.
5. Antigorite, 10c. to 50c. 6. Williamsite, 5c. to $1.00.
7. Marmolite, 5c. to 50c. 8. Thermophyllite.
9. Chrysotile, 5c. to 50c. 10. Picrolite, 5c. to 50c. Baltimorite, 10c. to 50c.
412. **Bastite,** orthorhombic (?); hydrous silicate of magnesium.
412A. **Refdanskite,** massive; hydrous silicate of magnesium, nickel, iron, &c.
413. **Deweylite,** 5c. to 50c.; massive; hydrous silicate of magnesium.
414. **Cerolite,** massive; hydrous silicate of magnesium.
414A. **Limbachite,** (Ap. II., p. 34), massive; hydrous silicate of aluminum and magnesium.

415. **Hydrophite,** massive; hydrous silicate of magnesium and iron.
415A. **Dermatin,** massive; hydrous silicate of magnesium and iron. (?) [aluminum.
415B. **Aquacreptite,** (Ap. I., p. 2), massive; hydrous silicate of magnesium, iron and
416. **Genthite,** 10c. to $1.00; massive; hydrous silicate of nickel and magnesium.
416A. **Garnierite,** (Ap. II., p. 23), 5c. to 50c.; massive; hydrous silicate of nickel and magnesium.
417. **Saponite,** massive; hydrous silicate of magnesium and aluminum.
418. **Pholerite,** 10c. to 50c.; orthorhombic; hydrous silicate of aluminum.
418A. **Teratolite,** massive; hydrous silicate of aluminum and iron.
419. **Kaolinite,** 5c. to 25c.; orthorhombic; hydrous silicate of aluminum.
420. **Halloysite,** 5c. to 50c., massive; hydrous silicate of aluminum.
421. **Samoite,** massive; hydrous silicate of aluminum.
422. **Pinite,** 10c. to $5.00; massive; hydrous silicate of aluminum and potassium. Var. 1. Gieseckite, 50c. to $2.50: 2. Agalmatolite, 50c. to $5.00.
423. **Cataspilite,** massive; hydrous silicate of aluminum, potassium and magnesium.
424. **Biharite,** massive, hydrous silicate of magnesium, aluminum, calcium and potassium.
425. **Palagonite,** massive; hydrous silicate of aluminum, iron, calcium and magnesium. [magnesium.
426. **Fahlunite,** 25c. to $1.00; massive; hydrous silicate of aluminum, iron and
427. **Groppite,** massive; hydrous silicate of aluminum, magnesium and potassium.
428. **Voigtite,** massive; hydrous silicate of aluminum, iron and magnesium.
429. **Margarodite,** 10c. to 50c.; monoclinic; hydrous muscovite. [&c,
429A. **Gilbertite,** 25c. to $1.00; massive; hydrous silicate of aluminum, potassium.
430. **Damourite,** 5c. to 50c.; massive; hydrous silicate of aluminum and potassium.
431. **Paragonite,** massive; hydrous silicate of aluminum and sodium.
431A. **Ivigtite,** (Ap. I., p. 7), massive; hydrous silicate of aluminum, sodium and iron.
432. **Euphyllite,** massive; hydrous silicate of aluminum, sodium, potassium, &c.
433. **Oellacherite,** massive; hydrous silicate of aluminum, potassium, magnesium, barium, &c. [potassium.
434. **Cookeite,** 10c. to 50c.; massive; hydrous silicate of aluminum, lithium and
435. **Hisingerite,** massive; hydrous silicate of iron.
436. **Ekmannite,** massive; hydrous silicate of iron and manganese.
437. **Neotocite,** massive; hydrous silicate of manganese, &c. [iron.
438. **Stübelite,** massive; hydrous silicate of manganese, copper, aluminum and
439. **Gillingite,** massive; hydrous silicate of iron, &c.
440. **Jollyte,** massive; hydrous silicate of aluminum, iron and magnesium.
441. **Epichlorite,** massive; hydrous silicate of magnesium, aluminum and iron.
442. **Polyhydrite,** massive; hydrous silicate of iron, aluminum and manganese.
442B. **Hygrophilite,** (Ap. II., p. 29, et. al.): massive; hydrous silicate of aluminum, iron, potassium, &c.
443. **Lillite,** massive; hydrous silicate of iron and calcium.
444. **Chlorite-like Mineral,** massive; hydrous silicate of iron and aluminum.
445. **Pyrosclerite,** orthorhombic or monoclinic; hydrous silicate of magnesium, aluminum, iron and chromium. [inum and iron.
445A. **Vermiculite,** 5c. to 50c.; hexagonal; hydrous silicate of magnesium, alum-
445C. **Hallite** (Ap. II., p. 26), hexagonal (?); hydrous silicate of magnesium, aluminum and iron. [inum and iron.
445D. **Vaalite** (Ap. II., p. 58), monoclinic; hydrous silicate of magnesium, alum-
446. **Chonicrite,** massive; hydrous silicate of magnesium, aluminum, iron and calcium. [inum and iron.
447. **Jefferisite,** 5c. to $1.00; orthorhombic; hydrous silicate of magnesium, alum-
447A. **Kerrite** (Ap. II., p. 31), massive; hydrous silicate of magnesium and aluminum.
447B. **Maconite** (Ap. II., p. 36), massive; hydrous silicate of aluminum, iron, magnesium and potassium.
448. **Penninite,** 25c. to $2.50; rhombohedral; hydrous silicate of magnesium and Var. Kämmererite, 25c. to $2.50. [aluminum.
449. **Delessite,** 25c. to $2.00; massive; hydrous silicate of magnesium, aluminum and iron.
450. **Ripidolite,** 5c. to $2.50; monoclinic; hydrous silicate of magnesium and aluminum. [and aluminum.
451. **Leuchtenbergite,** $1.00 to $5.00; hexagonal; hydrous silicate of magnesium

452. **Prochlorite**, 5c. to 50c.; hexagonal; hydrous silicate of aluminum, iron and
453. **Chlorite-like Mineral**, from N. C. [magnesium.
454. **Aphrosiderite**, 10c. to 50c.; hexagonal; hydrous silicate of iron and aluminum. [magnesium.
454A. **Strigovite** (Ap. II., p. 53). hexagonal; hydrous silicate of aluminum, iron and
455. **Metachlorite**, massive; hydrous silicate of iron and aluminum.
456. **Cronstedtite**, 25c. to $2.50; rhombohedral; hydrous silicate of iron, manganese and magnesium. [nesium.
457. **Corundophilite**, monoclinic; hydrous silicate of aluminum, iron and mag-
458. **Chloritoid**, monoclinic; hydrous silicate of iron and aluminum.
458A. **Phyllite**, 5c. to 25c.; monoclinic (?); hydrous silicate of aluminum, iron and manganese. [iron and magnesium.
458B. **Grochauite** (Ap. II., p. 25), monoclinic (?); hydrous silicate of aluminum,
459. **Margarite**, 5c. to $1.00; orthorhombic; hydrous silicate of aluminum and calcium.
459A. **Dudleyite** (Ap. II., p. 17), hydrous silicate of aluminum, magnesium, iron, &c.
459B. **Willcoxite** (Ap. II., p. 61), hydrous silicate of aluminum, magnesium, sodium, potassium and iron.
460. **Thuringite**, massive; hydrous silicate of aluminum and iron.
461. **Seybertite**, 5c. to 50c.; monoclinic; hydrous silicate of aluminum, magne-
Var. Clintonite, 5c. to 50c. [sium, calcium and iron
462. **Wolchonskoite**, massive; hydrous silicate of chromium, aluminum and iron
463. **Selwynite**, massive; hydrous silicate of aluminum, chromium and magnesium.
464. **Chrome Ochre**, massive; hydrous silicate of aluminum, chromium and iron.
465. **Miloschite**, massive; hydrous silicate of aluminum and chromium.
466. **Pimelite**, massive; hydrous silicate of aluminum, iron, nickel and magnesium.
467. **Chlorophæite**, massive; hydrous silicate of iron.
468. **Klipsteinite**, massive; hydrous silicate of manganese and iron.
469. **Chamoisite**, massive; hydrous silicate of iron and aluminum.
Var. Berthierine; 5c. to 50c. [and zirconium.
470. **Alvite**, tetragonal; hydrous silicate of aluminum, iron, yttrium, thorium
470A. **Picrofluite**, massive; probably a mixture of fluorite with a magnesian silicate.

II.—TANTALATES, COLUMBATES.

471. **Pyrochlore**, 50c. to $2.50; isometric; columbate of calcium, cerium, &c.
471A. **Koppite** (Ap. II., p. 32), isometric; columbate of calcium, cerium, &c.
472. **Microlite**, 25c. to $5.00; isometric; tantalate of calcium, manganese and magnesium. [ganese.
473. **Tantalite**, 50c. to $2.50: orthorhombic; columbo-tantalate of iron and man-
474. **Columbite**, 10c. to $1.50; orthorhombic; tantalo-columbate of iron and man-
475. **Tapiolite**, tetragonal; tantalate of iron. [ganese.
476. **Hielmite**, massive; stanno-tantalate of iron, uranium and yttrium.
477. **Yttrotantalite**, orthorhombic; columbo-tantalate of yttrium, cerium, calcium, iron, &c. [iron, &c.
478. **Samarskite**, 10c. to $2.50; orthorhombic; columbate of yttrium, uranium,
478A. **Nohlite** (Ap. II., p. 41), massive; hydrous columbate of yttrium, uranium, iron, &c. [titanium, &c.
479. **Euxenite**, 25c. to $5.00; orthorhombic: columbo-tantalate of yttrium, uranium
480. **Æschynite**, 50c. to $2.50; orthorhombic; titano-columbate of yttrium, cerium, lanthanum, &c. [uranium, &c.
481. **Polycrase**, 50c. to $2.50; orthorhombic; columbate of titanium, yttrium,
482. **Polymignite**, orthorhombic; titanate of zirconium, iron, yttrium, cerium, &c.
483. **Fergusonite**, 25c. to $5.00; tetragonal; columbate of yttrium.
484. **Adelpholite**, tetragonal; hydrous columbate of iron and manganese.
485. **Mengite**, orthorhombic; titanate of zirconium and iron.
486. **Rutherfordite**, monoclinic; titanate of calcium, cerium, &c.

3. PHOSPHATES, ARSENATES, ANTIMONATES, NITRATES.
A. PHOSPHATES, ARSENATES, ANTIMONATES.
I. ANHYDROUS.

490. **Xenotime**, 25c. to $3.50; tetragonal; phosphate of yttrium.

491. **Cryptolite,** tetragonal; phosphate of cerium. [fluoride of calcium.
492. **Apatite,** 5c. to $2.50; hexagonal; phosphate of calcium with chloride or
Var. 1. Asparagus stone, 25c. to $2.00; 2. Francolite, 50c. to $2.50.
493. **Pyromorphite,** 10c. to $3.50; hexagonal; phosphate and chloride of lead.
'494. **Mimetite,** 25c. to $3.50; hexagonal; arsenate and chloride of lead.
Var. Campylite; 25c. to $3.50.
495. **Wagnerite,** 25c. to $2.50; monoclinic; fluo-phosphate of magnesium.
Var. Kjerulfine; 25c. to $2.50. (Ap. II., p. 31, and III., p. 130.)
496. **Monazite,** 10c. to $3.50; monoclinic; phosphate of cerium, lanthanum, didymium and thorium.
496A. **Korarfveite** (Ap. II., p. 32), fluo-phosphate of cerium.
497. **Turnerite,** $1.00 to $3.50; variety of Monazite. [lithium.
498. **Triphylite,** 10c. to $1.00; orthorhombic; phosphate of iron, manganese and
Var. 1. Lithiophilite; 10c. to $1.00; a manganesian variety (Ap. III., p. 124.)
2. Natrophilite; a sodium-manganese variety. (*A. J. S.*, March '90.)
499. **Triplite,** 10c. to 50c.; monoclinic; fluo-phosphate of iron and manganese.
500. **Hopeite,** orthorhombic; hydrous phosphate of zinc.
501. **Berzeliite,** massive; arsenate of calcium, magnesium and manganese.
502. **Carminite,** orthorhombic; arsenate of iron and lead.
503. **Amblygonite,** 5c. to 50c.; fluo-phosphate of aluminum and lithium.
503A. **Durangite** (Ap. I., p. 4), 25c. to $2.50; monoclinic; fluo-arsenate of aluminum, iron, sodium, &c. [calcium.
504. **Herderite,** $1.00 to $5.00; orthorhombic; fluo-phosphate of beryllium and
505. **Monimolite,** tetragonal; antimonate of lead, iron, manganese, calcium and
506. **Romeite,** tetragonal; antimonate of calcium. [magnesium.
507. **Ammiolite,** massive; antimonate of copper with cinnabar. [and silver.
507A. **Rivotite,** (Ap. II., p. 48), massive; antimonate and carbonate of copper
508. **Arsenate of Nickel,** massive; ($Ni_5As_2O_{10}$).
509. **Arsenate of Nickel,** Xanthiosite; massive; ($Ni_3As_2O_8$). [lead.
510. **Nadorite** (Ap. I., p. 11), 10c. to $1.50; orthorhombic; chloro-antimonate of

II.—HYDROUS.

515. **Stercorite,** massive; hydrous phosphate of sodium and ammonium.
516. **Struvite,** 50c. to $2.50; orthorhombic, hydrous phosphate of magnesium and
517. **Haidingerite,** orthorhombic; hydrous arsenate of calcium. [ammonium.
518. **Brushite,** monoclinic; hydrous phosphate of calcium. [carbonate of calcium.
518A. **Kollophan,** (Ap. I., p. 9), hydrous phosphate of calcium, with 8 per cent.
519. **Metabrushite,** 25c. to $2.50; monoclinic; hydrous phosphate of calcium.
520. **Pharmacolite,** 50c. to $5.00; monoclinic; hydrous arsenate of calcium.
520A. **Picropharmacolite** (Ap. II., p. 44), hydrous arsenate of calcium and mag-
520B. **Isoclasite** (Ap. I., p. 7), monoclinic; hydrous phosphate of calcium. [nesium.
520C. **Wapplerite** (Ap. II., p. 60), triclinic; hydrous arsenate of calcium and mag-
521. **Churchite,** monoclinic; hydrous phosphate of cerium and calcium. [nesium.
522. **Hoernesite,** monoclinic; hydrous arsenate of magnesium.
523. **Roesslerite,** massive; hydrous arsenate of magnesium.
523A. **Bobierrite,** monoclinic; hydrous phosphate of magnesium.
524. **Vivianite,** 5c. to $2.00; monoclinic; hydrous phosphate of iron.
Beraunite and Eleonorite are near Vivianite. (See Ap. III., p. 13.)
525. **Symplesite,** monoclinic; hydrous arsenate of iron.
526. **Erythrite,** 10c. to $3.50; monoclinic; hydrous arsenate of cobalt. [magnesium.
526A. **Roselite,** $2.50 to $20.00; triclinic; hydrous arsenate of cobalt, calcium and
526B. **Lavendulan,** 25c. to $2.50; massive; hydrous arsenate of cobalt, nickel and copper. [*S.*, XXIV., p. 476).
526C. **Winklerite** (Ap. II., p. 61), massive; hydrous oxide of cobalt and nickel, (*A. J.*
527. **Annabergite,** 25c. to $2.50; monoclinic; hydrous arsenate of nickel.
528. **Forbesite,** massive; hydrous bibasic arsenate of nickel and cobalt.
529. **Cabrerite,** monoclinic; hydrous arsenate of nickel, cobalt and magnesium
530. **Köttigite,** monoclinic; hydrous arsenate of zinc, cobalt and nickel.
531. **Hureaulite,** monoclinic; hydrous phosphate of manganese and iron.

532. **Chondrarsenite,** massive; hydrous arsenate of manganese.
533. **Trichalcite,** massive; hydrous arsenate of copper.
534. **Thrombolite,** massive; hydrous phosphate of copper.
535. **Libethenite,** 50c. to $3.50; orthorhombic; hydrous phosphate of copper.
536. **Olivenite,** 10c. to $2.50; orthorhombic; hydrous arsenate of copper. See
537. **Adamite,** 25c. to $5.00; orthorhombic; hydrous arsenate of zinc. [page 37.
538. **Conichalcite,** 10c. to $3.50; massive; hydrous arsenate of copper and calcium. See page 38.
539. **Bayldonite,** massive; hydrous arsenate of copper and lead.
540. **Euchroite,** $1.00 to $10.00; orthorhombic; hydrous arsenate of copper.
541. **Tagilite,** monoclinic; hydrous phosphate of copper. [and zinc
541A. **Veszelyite** (Ap. II., p. 59), triclinic; hydrous arseno-phosphate of copper
542. **Liroconite,** 50c. to $3.50; monoclinic; hydrous arsenate of copper and aluminum.
543. **Pseudomalachite,** 50c. to $5.00; monoclinic; hydrous phosphate of copper.
544. **Erinite,** 25c. to $2.50; massive (?); hydrous arsenate of copper. See page 37.
545. **Cornwallite,** massive; hydrous arsenate of copper.
546. **Tyrolite,** 10c. to $3.50; orthorhombic; hydrous arsenate of copper. See page 38. [page 39.
547. **Clinoclasite,** 10c. to $5.00; monoclinic; hydrous arsenate of copper. See
548. **Chalcophyllite,** 50c. to $3.50; rhombohedral; hydrous arsenate of copper. [See page 39.
549. **Berlinite,** massive; hydrous phosphate of aluminum.
550. **Callainite,** massive; hydrous phosphate of aluminum.
550A. **Zepharovichite** (Ap. I., p. 17), massive; hydrous phosphate of aluminum.
551. **Lazulite,** 5c. to $2.00; monoclinic; hydrous phosphate of aluminum and magnesium. [inum.
552. **Barrandite,** 50c. to $2.50; massive; hydrous phosphate of iron and alum-
553. **Scorodite,** 10c. to $2.50; orthorhombic; hydrous arsenate of iron. See page 42.
554. **Wavellite,** 5c. to $2.50; orthorhombic; hydrous phosphate of aluminum.
554A. **Kapnicite,** probably Wavellite.
554B. **Planerite,** massive; hydrous phosphate of aluminum, copper and iron.
554C. **Coeruleolactite** (Ap. I., p. 3, and Ap. II., p. 13) massive; hydrous phosphate of aluminum and copper. [and magnesium.
555. **Trolleite,** massive; hydrous phosphate of aluminum. [and lead.
556. **Plumbogummite,** 25c. to $2.50; massive; hydrous phosphate of aluminum
557. **Calcioferrite,** monoclinic; hydrous phosphate of iron, calcium, aluminum and magnesium.
558. **Pharmacosiderite,** 10c. to $2.50; isometric; hydrous arsenate of iron. (See
559. **Cirrolite,** massive; hydrous phosphate of calcium and aluminum. [page 41.)
560. **Childrenite,** 50c. to $3.50; orthorhombic; hydrous phosphate of iron, alum- Var. Eosphorite—see Ap. III., p. 24. [inum and manganese.
561. **Attacolite,** massive; hydrous phosphate of aluminum, calcium, iron and
562. **Augelite,** massive; hydrous phosphate of aluminum. [manganese.
563. **Turquois,** 10c. to $3.50; massive; hydrous phosphate of aluminum.
564. **Peganite,** orthorhombic; hydrous phosphate of aluminum.
565. **Fischerite,** orthorhombic; hydrous phosphate of aluminum.
565A. **Variscite,** 10c. to $2.00; hydrous phosphate of aluminum. Ap. III., p. 128—now considered a variety of Callainite.
566. **Tavistockite,** massive; hydrous phosphate of aluminum and calcium.
567. **Chenevixite,** 25c. to $2.50; massive; hydrous arsenate of copper and iron.
568. **Dufrenite,** 5c. to $2.50; orthorhombic; hydrous phosphate of iron.
569. **Cacoxenite,** 50c. to $2.50; massive; hydrous phosphate of iron. [cium.
570. **Arseniosiderite,** 25c. to $2.50; massive; hydrous arsenate of iron and cal-
571. **Evansite,** 25c. to $2.50; massive; hydrous phosphate of aluminum.
572. **Torbernite,** 10c. to $3.50; tetragonal; hydrous phosphate of uranium and copper. [copper.
572A. **Zeunerite** (Ap. II., p. 62), tetragonal; hydrous arsenate of uranium and
573. **Autunite,** 10c. to $3.50; orthorhombic; hydrous phosphate of uranium and calcium. [nium.
573A. **Walpurgite** (Ap. I., p. 16), triclinic; hydrous arsenate of bismuth and ura-
573B. **Trögerite** (Ap. I., p. 16), monoclinic; hydrous arsenate of uranium.

578C. **Uranospinite** (Ap. II., p. 58), orthorhombic; hydrous arsenate of uranium
and calcium. [nesium.
574. **Amphithalite,** massive; hydrous phosphate of aluminum, calcium and mag-
575. **Sphærite,** 50c. to $2.00; massive; hydrous phosphate of aluminum.
576. **Borickite,** 50c. to $2.50; hydrous phosphate of iron and calcium.
577. **Rhagite** (Ap. II., p. 48), isometric (?); hydrous arsenate of bismuth.
580. **Diadochite,** 25c. to $2.00; massive; hydrous phosphate and sulphate of iron.
581. **Pitticite,** massive; hydrous arsenate and sulphate of iron. [lead.
582. **Beudantite,** rhombohedral; hydrous phosphate and sulphate of iron and
583. **Lindackerite,** orthorhombic; hydrous arsenate and sulphate of copper and
nickel. [phate of aluminum and calcium.
584. **Svanbergite,** 25c. to $2.50; rhombohedral; hydrous phosphate and sul-
585. **Ficinite,** monoclinic; hydrous phosphate and sulphate of iron and manganese.
586. **Bindheimite,** massive; hydrous antimonate of lead.
587. **Stibioferrite** (Ap. II., p. 53), massive; hydrous antimonate of iron.

B.—NITRATES.

590. **Nitre,** orthorhombic; nitrate of potassium.
591. **Soda Nitre,** rhombohedral; nitrate of sodium.
592. **Nitrocalcite,** massive; hydrous nitrate of calcium.
593. **Nitromagnesite,** massive; nitrate of magnesium.

IV.—BORATES.

594. **Sassolite,** triclinic; boracic acid.
595. **Szaibelyite,** massive; hydrous borate of magnesium.
595A. **Ludwigite** (Ap. II., p. 35), 25c. to $1.50; massive: borate of iron and
magnesium. [magnesium.
595B. **Sussexite** (Ap. I., p. 15), 50c. to $2.00; hydrous borate of manganese and
596. **Hydroboracite,** massive; hydrous borate of calcium and magnesium.
597. **Boracite,** 10c. to $2.50; isometric; borate and chloride of magnesium.
597A. **Huyssenite,** massive; borate of magnesium and iron.
598. **Rhodizite,** isometric; supposed to be lime boracite.
598A. **Lüneburgite** (Ap. I., p. 10), phospho-borate of magnesium.
599. **Borax,** 10c. to $2.00; monoclinic; hydrous borate of sodium.
600. **Bechilite,** massive; hydrous borate of calcium.
600A. **Priceite** (Ap. II., p. 45), 25c. to $1.50; massive; hydrous borate of calcium.
601. **Howlite,** 25c. to $2.00; orthorhombic(?); hydrous boro-silicate of calcium.
601A. **Winkworthite** (Ap. I., p. 17), mixture of howlite and gypsum(?).
602. **Ulexite,** 10c. to $2.00; massive; hydrous borate of calcium and sodium.
603. **Cryptomorphite,** massive; hydrous borate of calcium and sodium.
604. **Larderellite,** massive; hydrous borate of ammonium.
605. **Lagonite,** massive; hydrous borate of iron.
606. **Warwickite,** 5c. to $1.00: monoclinic; boro-titanate of magnesium and iron.

V.—TUNGSTATES, MOLYBDATES, VANADATES.

610. **Wolframite,** 5c. to $2.50; monoclinic; tungstate of iron and manganese.
611. **Hübnerite,** 10c. to $2.50; orthorhombic; tungstate of manganese.
We have terminated crystals from Colorado.
612. **Ferberite,** massive; tungstate of iron and manganese.
613. **Megabasite,** 25c. to $2.50; orthorhombic; tungstate of iron and manganese.
614. **Scheelite,** 25c. to $2.50; tetragonal; tungstate of calcium.
615. **Cuproscheelite,** massive; tungstate of calcium and copper.
615A. **Cuprotungstite,** (Ap. II., p. 14), massive; tungstate of copper.
616. **Stolzite,** 50c. to $5.00; tetragonal; tungstate of lead.
617. **Wulfenite,** 5c. to $10.00; tetragonal; molybdate of lead.
We have a fine stock. See page 33.
617A. **Eosite,** (Ap. I., p. 5), tetragonal; vanadio-molybdate of lead (?).
618. **Pateraite,** massive; molybdate of cobalt.

619. **Decheinte,** massive; vanadate of lead and zinc.
620. **Descloizite,** 5c. to $5.00; orthorhombic; hydrous vanadate of lead and zinc.
Var. Cuprodescloizite; 25c. to $2.00. See page 31.
621. **Vanadinite,** 5c. to $10.00; hexagonal; chloro-vanadate of lead.
We have a very complete stock. See page 34.
622. **Volborthite,** hexagonal; hydrous vanadate of copper.
622A. **Vanadate** of lime and copper.
622B. **Vanadiolite** (Ap. I., p. 16), silico-vanadate of calcium.
623. **Chileite,** massive; vanadate of lead and copper.
623A. **Vanadate** from the Lake Superior Copper Region.
624 **Pucherite** (Ap. I., p. 12), 50c. to $3.50; orthorhombic; vanadate of bismuth.
624A. **Uranosphaerite** (Ap. II., p. 57), massive; hydrous uranate of bismuth.

6. SULPHATES, CHROMATES, TELLURATES.

I.—ANHYDROUS.

625. **Sulphatite,** sulphuric acid.
626. **Taylorite,** massive; sulphate of potassium and ammonium.
627. **Aphthitalite,** orthorhombic; sulphate of potassium.
628. **Misenite,** massive; hydrous sulphate of potassium.
629. **Thenardite,** 10c to $1.00; orthorhombic; sulphate of sodium.
630. **Barite,** 5c. to $5.00; orthorhomic; sulphate of barium.
631. **Celestite,** 5c. to $5.00; orthorhombic; sulphate of strontium.
632. **Anhydrite,** 5c. to $1.00; orthorhombic; sulphate of calcium.
633. **Anglesite,** 5c. to $3.50; orthorhombic; sulphate of lead.
634. **Zinkosite,** orthorhombic; sulphate of zinc.
634A. **Hydrocyanite,** (Ap. II., p. 29), orthorhombic; sulphate of copper.
634B. **Dolerophanite,** (Ap. II., p. 17), monoclinic; sulphate of copper.
635. **Leadhillite,** 50c. to $5.00; orthorhombic; sulpho-carbonate of lead.
636. **Caledonite,** 25c. to $3.50; monoclinic; sulphate of lead and copper.
637. **Dreelite,** rhombohedral; sulphate of barium and calcium.
638. **Susannite,** rhombohedral; sulpho-carbonate of lead.
639. **Connellite,** $5.00; hexagonal; chloro-sulphate of copper.
640. **Glauberite,** 10c. to $1.00; monoclinic; sulphate of sodium and calcium.
641. **Lanarkite,** $1.00 to $3.50; sulphate of lead.
642. **Crocoite,** 10c. to $10.00; monoclinic; chromate of lead.
643. **Phœnicochroite,** 50c. to $2.50; orthorhombic; chromate of lead.
644. **Vauquelinite,** 50c. to $2.50; monoclinic: chromate of lead and copper.
644A. **Laxmannite,** (Ap. I., p. 9); monoclinic; phospho-chromate of lead and copper.
645. **Jossaite,** $1.00 to $5.00; orthorhombic; chromate of lead and zinc.
646. **Pettkoite,** isometric; sulphate of iron.
647. **Alumian,** cryst. (?); sulphate of aluminum. (?)

II.—HYDROUS.

650. **Mascagnite,** orthorhombic; hydrous sulphate of ammonium.
651. **Boussingaultite,** orthorhombic; hydrous sulphate of ammonium and magnesium.
652. **Lecontite,** orthorhombic; hydrous sulphate of ammonium, sodium and potassium.
652A. **Guanovulite** (Ap. II., p. 64), massive; hydrous sulphate of ammonium and potassium.
653. **Mirabilite,** monoclinic; hydrous sulphate of sodium.
654. **Gypsum,** 5c. to $2.50; monoclinic; hydrous sulphate of calcium.
Var. 1. Selenite, 5c. to $2.50; 2. Satin Spar, 5c. to $1.00; 3. Alabaster, 10c. to $1.00.
655. **Kieserite,** orthorhombic; hydrous sulphate of magnesium.
656. **Polyhalite,** 10c. to $1.00; orthorhombic; hydrous sulphate of calcium, magnesium and potassium.
656A. **Syngenite** (Ap. II., p. 54), monoclinic; hydrous sulphate of potassium and calcium.
657. **Mamanite,** massive; hydrous silicate of calcium, magnesium and potassium.

658. **Picromerite,** 10c. to $1.00; monoclinic; hydrous sulphate of potassium and magnesium.
659. **Blœdite,** massive; hydrous sulphate of sodium and magnesium.
660. **Loeweite,** tetragonal; hydrous sulphate of sodium and magnesium.
661. **Epsomite,** 10c. to $1.00; orthorhombic; hydrous sulphate of magnesium.
662. **Tauriscite,** orthorhombic; hydrous sulphate of iron.
662A. **Tecticite,** orthorhombic; hydrous sulphate of iron.
663. **Fausicite,** orthorhombic; hydrous sulphate of manganese and magnesium.
664. **Melanterite** 10c. to $1.00; monoclinic; hydrous sulphate of iron.
665. **Pisanite,** massive; hydrous sulphate of iron and copper.
666. **Goslarite,** orthorhombic; hydrous sulphate of zinc.
667. **Bieberite,** monoclinic; hydrous sulphate of cobalt.
668. **Morenosite,** massive; hydrous sulphate of nickel.
669. **Chalcanthite,** 5c. to $2.50; triclinic; hydrous sulphate of copper.
669A. **Cupromagnesite,** (Ap. II., p. 14), hydrous sulphate of copper and magnesium.
670. **Cyanochroite,** monoclinic; hydrous sulphate of potassium and copper.
671. **Alunogen,** 25c. to $1.50; monoclinic; hydrous sulphate of aluminum.
672. **Coquimbite,** 10c. to $2.00; hexagonal; hydrous sulphate of iron.
673. **Tschermigite,** isometric; hydrous sulphate of aluminum and ammonium.
674. **Kalinite,** 10c. to $1.00; isometric; hydrous sulphate of aluminum and potassium.
675. **Voltaite,** isometric; hydrous sulphate of iron.
676. **Blakeite,** isometric; near Coquimbite.
677. **Mendozite,** massive; hydrous sulphate of aluminum and sodium.
678. **Pickeringite,** monoclinic (?); hydrous sulphate of aluminum and magnesium.
679. **Apjohnite,** massive; hydrous sulphate of aluminum and manganese.
680. **Bosjemanite,** monoclinic; hydrous sulphate of aluminum, manganese and magnesium.
681. **Halotrichite,** massive; hydrous sulphate of aluminum and iron.
682. **Roemerite,** 10c. to $2.00; monoclinic; hydrous sulphate of iron and zinc.
683. **Copiapite,** 10c. to $2.00; hexagonal; hydrous sulphate of iron.
684. **Raimondite,** hexagonal; hydrous sulphate of iron.
685. **Fibroferrite,** 25c. to $2.50; massive; hydrous sulphate of iron.
686. **Apatelite,** massive; hydrous sulphate of iron.
687. **Botryogen,** 25c. to $2.00; monoclinic; hydrous sulphate of iron.
687A. **Bartholomite** (Ap. II., p. 6), massive; hydrous sulphate of iron and sodium.
688. **Aluminite,** 10c. to $1.00; massive; hydrous sulphate of aluminum.
688A. **Ettringite** (Ap. II., p. 19), hexagonal; hydrous sulphate of calcium and aluminum.
689. **Alunite,** 10c. to $1.00; rhombohedral; hydrous sulphate of aluminum and potassium.
690. **Löwigite,** massive; hydrous sulphate of aluminum and potassium.
691. **Jarosite,** 10c. to $2.50; rhombohedral; hydrous sulphate of iron and potassium. See page 42.
692. **Carphosiderite,** massive; hydrous sulphate of iron.
693. **Paraluminite,** massive; hydrous sulphate of aluminum.
694. **Pissophanite,** massive; hydrous sulphate of aluminum and iron.
695. **Felsobanyite,** orthorhombic; hydrous sulphate of aluminum.
696. **Glockerite,** massive; hydrous sulphate of iron.
697. **Lamprophanite,** massive; hydrous sulphate of lead, calcium, manganese, magnesium, etc.
700. **Linarite,** 25c. to $3.50; monoclinic; hydrous sulphate of lead and copper.
701. **Brochantite,** 10c. to $2.50; orthorhombic; hydrous sulphate of copper. See page 45.
702. **Langite,** 25c. to $2.50; orthorhombic; hydrous sulphate of copper.
703. **Cyanotrichite,** Lettsomite; 50c. to $5.00; massive; hydrous sulphate of copper and aluminum. See page 43.
704. **Woodwardite,** $1.00 to $2.50; massive; hydrous sulphate of copper and aluminum.
705. **Johannite,** monoclinic; hydrous sulphate of uranium and copper.
706. **Uranochalcite,** massive: hydrous sulphate of uranium, copper, and calcium.
707. **Medjidite,** massive; hydrous sulphate of uranium and calcium.
708. **Zippeite,** massive; hydrous sulphate of uranium.
709. **Voglianite,** massive; hydrous sulphate of uranium.
710. **Uraconite,** massive; hydrous sulphate of uranium.
711. **Montanite,** massive; hydrous tellurate of bismuth.
712. **Kerstenite,** massive; selenate of lead.

7. CARBONATES.

I. ANHYDROUS.

715. **Calcite,** 5c. to $10.00; rhombohedral; carbonate of calcium.
Var. 1. Iceland Spar, 5c. to $2.50. 2. Plumbocalcite, 50c. $3.50. [$1.00.
3. Fontainebleau Limestone, 5c. to $2.00. 4. Argentine, 10c. to
5. Marble, 5c. to $2.50. 6. Lumachelle, 50c. to $2.50. [$2.50.
7. Chalk, 5c. to 25c. 8. Oölite, 5c. to 25c. 9. Pisolite, 25c. to
10. Stalactites and Stalagmites, 5c. to $2.50.
11. Travertine, 10c. to $1.00. 12. Calcareous Tufa, 10c. to 50c.
13. Agaric Mineral and Rock Meal, 10c. to 50c.
Our stock of calcite is very large and varied, including the finest crystals obtainable, and a very full assortment of the varieties, a few of which only are noted above. Blue Calcite, 5c. to 50c.; Orange Calcite, 5c. to 50c.; and other varieties are very popular.
See also page 57.
716. **Dolomite,** 5c. to $2.50; rhombohedral; carbonate of calcium and magnesium.
717. **Ankerite,** 5c. to $1.00; rhombohedral; carbonate of calcium, magnesium and [iron.
718. **Magnesite,** 5c. to $1.00; rhombohedral; carbonate of magnesium.
Var. Breunerite, 10c. to $1.00.
719. **Mesitite,** 25c. to $2.50; rhombohedral; carbonate of magnesium and iron.
720. **Pistomesite,** rhombohedral; carbonate of iron and magnesium.
721. **Siderite,** 5c to $2.50; rhombohedral; carbonate of iron.
722. **Rhodochrosite,** 5c. to $5.00; rhombohedral; carbonate of manganese.
723. **Smithsonite,** 5c. to $2.50; rhombohedral; carbonate of zinc.
724. **Aragonite,** 5c. to $5.00; orthorhombic; carbonate of calcium.
Var. 1. Flos Ferri, 10c. to $5.00.
2. Mossottite, 25c. to $2.00. [nesium.
725. **Manganocalcite,** orthorhombic; carbonate of manganese, calcium and mag-
726. **Witherite,** 5c. to $3.50; orthorhombic; carbonate of barium.
727. **Bromlite,** 25c. to $2.00; orthorhombic; carbonate of barium and calcium.
728. **Strontianite,** 5c. to $2.50; orthorhombic; carbonate of strontium.
729. **Cerussite,** 5c. to $2.50; orthorhombic; carbonate of lead.
730. **Barytocalcite,** 25c. to $2.00; monoclinic; carbonate of barium and calcium.
731. **Parisite,** hexagonal; fluo-carbonate of cerium, lanthanum, didymium, and calcium.
732. **Kischtimite,** massive; hydrous fluo-carbonate of cerium and lanthanum.
732A. **Bastnäsite** (Ap. I., p. 2), 25c. to $2.50; orthorhombic (?); fluo-carbonate of cerium and lanthanum.
733. **Phosgenite,** $2.50 to $10.00; tetragonal; chloro-carbonate of lead.

II. HYDROUS.

735. **Teschemacherite,** massive; hydrous carbonate of ammonium.
736. **Natron,** monoclinic; hydrous carbonate of sodium.
737. **Thermonatrite,** orthorhombic; hydrous carbonate of sodium.
738. **Trona,** 25c. to $3.50; monoclinic; hydrous carbonate of sodium. [calcium.
739. **Gay-lussite,** 10c. to $1.00; monoclinic; hydrous carbonate of sodium and
740. **Hydromagnesite,** 5c. to $1.00; monoclinic; hydrous carbonate of magnesium.
741. **Hydrodolomite,** massive; hydrous carbonate of calcium and magnesium.
742. **Predazzite,** massive; hydrous carbonate of calcium and magnesium.
743. **Pencatite,** massive; hydrous carbonate of calcium and magnesium.
744. **Hovite,** massive; hydrous carbonate of calcium.
745. **Lanthanite,** orthorhombic; hydrous carbonate of lanthanum.
746. **Tengerite,** 50c. to $2.50; massive; hydrous carbonate of yttrium.
747. **Zaratite,** 10c. to $1.00; massive; hydrous carbonate of nickel.
748. **Remingtonite,** massive; hydrous carbonate of cobalt.
749. **Hydrozincite,** 5c. to 50c.; massive; hydrous carbonate of zinc.
750. **Aurichalcite,** 25c. to $2.50; massive; hydrous carbonate of zinc and copper.
750A. **Zinkazurite,** hydrous carbonate of zinc and copper.

751. **Malachite,** 5c. to $5.00; monoclinic; hydrous carbonate of copper. (See p. 35.)
752. **Azurite,** 5c. to $5.00; monoclinic; hydrous carbonate of copper. (See p. 35.)
752A. **Atlasite,** a carbonate of copper containing chlorine.
753 **Bismutite,** 10c. to $1.00; massive; hydrous carbonate of bismuth.
754. **Liebigite,** massive; hydrous carbonate of uranium and calcium.
755. **Voglite,** massive; hydrous carbonate of uranium, calcium and copper.
755A. **Schröckeringite** (Ap. II., p. 50), massive; hydrous oxy-carbonate of uranium.

8. OXALATES.

756. **Whewellite,** monoclinic; oxalate of calcium.
757. **Thierschite,** massive; oxalate of calcium.
758. **Humboldtine,** massive; hydrous oxalate of iron.

VI. HYDROCARBON COMPOUNDS.

The native hydrocarbons are very imperfectly known. Many of them, instead of being distinct species, are mere mixtures of species, as, for example, Amber, which is a mixture of four or more species. Petroleum, Asphaltum, and the various kinds of mineral resins and wax are similar mixtures. In view of these facts it seems proper to merely enumerate the species numbered as such in Dana's System.

761. **Tetrylic Hydride.**
762. **Pentylic Hydride.**
763. **Hexylic Hydride.**
764. **Heptylic Hydride.**
765. **Octylic Hydride.**
766. **Nonylic Hydride.**
767 to 771. **Beta-Naptha Group.**
772. **Scheererite.**
773. **Chrismatite.**
774. **Decatylene.**
775. **Endecatylene.**
776. **Dodecatylene.**
777. **Decatritylene.**
778. **Urpethite.**
779. **Hatchettite.**
780. **Ozocerite,** 5c. to 50c.
781. **Zietrisikite.**
782. **Elaterite.**
783. **Settling Stones Resin.**
784. **Fichtelite.**
785. **Hartite.**
786. **Dinite.**
787. **Ixolyte.**
788. **Benzole.**
789. **Toluole.**
790. **Xylole.**
791. **Cumole.**
792. **Cymole.**
793. **Könlite.**
794. **Naphthalin.**
795. **Idrialite,** 10c. to 50c.
795A. **Aragotite** (Ap. II., p. 4).
796. **Geocerite.**
797. **Geomyricite.**
798. **Copalite,** 10c. to $2.00.
799. **Succinite,** 10c. to $2.00.
800. **Walchowite.**
801. **Bucaramangite.**
802. **Ambrite.**
803. **Bathvillite.**
804. **Torbanite.**
805. **Xyloretinite.**
805A. **Bombiccite** (Ap. II., p. 8).
806. **Leucopetrite.**
807. **Euosmite.**
807A. **Rosthornite** (Ap. I., p. 14.)
808. **Scleretinite.**
809. **Pyroretinite** (Jaulingite).
810. **Reussinite.**
811. **Rochlederite.**
812. **Schlanite.**
813. **Guyaquillite.**
813A. **Beta-Jaulingite.**
813B. **Wheelerite** (Ap. II., p. 60.)
814. **Middletonite.**
815. **Stanekite.**
816. **Anthracoxenite.**
817. **Tasmanite,**
817A. **Trinkerite** (Ap. I., p. 16.)
818. **Dysodile.**
819. **Hircite.**
820. **Baikerinite.**
821. **Butyrellite.**
822. **Geocerellite.**
823. **Brücknerellite.**
824. **Succinellite.**
825. **Retinellite.**
826. **Dopplerite.**
827. **Melanellite.**
828. **Mellite,** 10c. to $1.00.
829. **Pigotite.**
829A. **Organic Salts of Iron.**
830. **Asphaltum,** 5c. to 25c.
830A. **Grahamite.**
830B. **Albertite.**
830C. **Piauzite.**
830D. **Berengelite.**
831. **Mineral Coal,** 5c. to 25c.

SPECIES OF UNCERTAIN PLACE IN THE SYSTEM.

832. **Azorite,** tetragonal; columbate of calcium (?).
833. **Brewsterlinite,** a fluid in the cavities of minerals.
834. **Cryptolinite,** a fluid in the cavities of minerals.
835. **Hessenbergite,** monoclinic; an anhydrous silicate.
836. **Parathorite,** orthorhombic; possibly a variety of thorite.
837. **Pyrrhite,** isometric; a columbate of zirconium.
838. **Alurgite,** massive; a purple manganese mineral.

Alphabetical List of New Species and Varieties.

Abriachanite (Ap. III., p. 1), massive; near Crocidolite.
Achrematite (Ap. III., p. 1), massive; an uncertain arsenate and molybdate of lead.
Aerinite (Ap. III., p. 2), 25c. to $1.00; blue heterogeneous mass of silicates.
Aerugite (Ap. II., p. 1), a doubtful arsenate of nickel.
Agnesite (p. 793), massive; carbonate of bismuth.
Agricolite (Ap. II., p. 1), monoclinic; silicate of bismuth.
Aimafibrite (*A. J. S.*, Sept. '84), orthorhombic; hydrous arsenate of manganese, etc.
Aimatolite (*A. J. S.*, Sept. '84), 50c. to $2.00; hexagonal; hydrous arsenate of manganese, etc. (Diadelphite is identical with Aimatolite.)
Ajkite (Ap. III., p. 3), a resin near amber. [ver and copper.
Alaskaite (Ap. III., p. 3), $1.00 to $5.00; massive; sulphide of bismuth, lead, sil-
Allaktite (*A. J. S.*, June, '84), $1.00 to $2.50; monoclinic; hydrous arsenate of manganese.
Allophite (Ap. II., p. 2), massive; silicate of aluminum and magnesium.
Amarantite (*A. J. S.*, Aug. '88), 25c. to $5.00; hydrous sulphate of iron.
Amblystegite (Ap. I., p. 1), orthorhombic; near Hypersthene.
Andrewsite (Ap. I., p. 1), massive; hydrous phosphate of iron and copper.
Animikite (Ap. III., pp. 6 and 71), antimonide of silver.
Annerödite (Ap. III., p. 7), orthorhombic; near Samarskite. [manganese.
Anthochroite (*A. J. S.*, Sept. '89), massive; silicate of magnesium, calcium and
Antillite (Ap. I., p. 1), a hydrated Bronzite; near Serpentine.
Arctolite (Ap. III., p. 9), massive; hydrous silicate of aluminum, calcium, and
Arequipite (Ap. III., p. 9), massive; a silico-antimonate of lead. (?) [magnesium.
Argentobismutite (*A. J. S.*, Mar. '86), sulphide of bismuth and silver.
Argyrodite (*A. J. S.*, Aug. '86), monoclinic; sulphide of silver and germanium.
Argyropyrite (Ap. III., pp. 9 and 115), orthorhombic; sulphide of silver and iron.
Arminite (*A. J. S.*, Aug. '86), hydrous sulphate of copper.
Arsenargentite (Ap. III., p. 9), orthorhombic; arsenide of silver.
Arseniopleite (*A. J. S.*, May '88), rhombohedral (?); hydrous arsenate of man-
Arsenstibite (Ap. II., p. 5), hydrous arsenate of antimony. [ganese, etc.
Atelite (Ap. III., pp. 10 and 120), hydrous oxide and chloride of copper.
Atopite (Ap. III., p. 10), isometric; antimonate of calcium, iron, etc.
Auerlite (*A. J. S.*, Dec. '88), tetragonal; hydrous phospho-silicate of thorium.
Avalite (*A. J S.*, Mar. '86), silicate of chromium and aluminum.
Barcenite (Ap. III., p. 11), massive; an uncertain antimonate.
Barettite (Ap. I., p. 3), massive; silicate, etc., of calcium, magnesium, iron, etc.
Barkevikite (*A. J. S.*, May, '88), near Arfvedsonite.
Barylite (Ap. III.. p. 12), massive; silicate of barium and aluminum.
Barysil (*A. J. S.*, May, '88), hexagonal; silicate of lead.
Beegerite (Ap. III., p. 13), 25c. to $5.00; isometric; sulphide of lead and bis-
Belonesite (*A. J. S.*, May, '88), tetragonal; molybdate of magnesium. [muth.
Bementite (*A. J. S.*, May, '88), 25c. to $3.50; massive; hydrous silicate of manganese. (See page 24.)

Bertrandite (*A. J. S.*, May, '84), 25c. to $10.00; orthorhombic; hydrous silicate of beryllium. (See page 51.) [lium and sodium. (See p. 18.)

Beryllonite (*A. J. S.*, Jan., '89), 10c. to $3.50; orthorhombic; phosphate of beryl-

Bischofite (Ap. III., p. 15), probably identical with Chloromagnesite.

Bismutoferrite (Ap. I., p. 3, and Ap. II., p. 7), silicate of iron and bismuth.

Bismutosphaerite (Ap. III., p. 15), massive; carbonate of bismuth.

Blomstrandite (Ap. III., p. 16), massive; hydrous titano-tantalo-columbate of uranium, iron, calcium, etc.

Bolivite (Ap. III., p. 16), oxy-sulphide of bismuth.

Brackebuschite (Ap. III., pp. 18 and 36), a variety of Descloizite.

Brandtite (*A. J. S.*, March, '90, p. 212), hydrous arsenate of calcium and manganese.

Bravaisite (Ap. III., p. 18), orthorhombic; near Glauconite.

Broggerite (*A. J. S.*, June, '84), uranate of thorium, yttrium, lead and cerium.

Buckingite (*A. J. S.*, Aug., '88), triclinic; hydrous sulphate of iron.

Bustamentite (Ap. II., p. 9), an iodide of lead.

Cacoclasite (Proc. Min. Sec. A. N. S., Phila., Nov. 26, 1883), 10c. to 50c.; "a mixture of quartz, calcite, apatite and other unknown minerals." Genth. *A. J. S.*, Sept. '89.

Calciothorite (*A. J. S.*, May, '88). hydrous silicate of thorium and calcium.

Calcozincite (Ap. III., p. 20), 10c. to 50c.; a mixture of zincite and calcite.

Cappelenite (*A. J. S.*, Mar., '86), hexagonal; boro-silicate of yttrium, &c.

Caracolite (*A. J. S.*, May, '87), orthorhombic; hydrous chloro-sulphate of lead and sodium.

Caryinite (Ap. III., p. 20), massive; arsenate of lead, manganese, &c. [magnesium.

Caryopilite (*A. J. S.*, June, '89), massive; hydrous silicate of manganese and

Catlinite, Indian Pipe Stone; (p. 796), 10c. to 50c.; a rock, not a mineral species.

Celestialite (Ap. III., p. 21), a metoric sulpho-hydrocarbon.

Chalcomenite (Ap. III., p. 23), monoclinic; hydrous selenite of copper.

Chalcophanite (Ap. III., p. 23), 5c. to $1.00; rhombohedral; hydrous oxide of manganese and zinc. [iron, copper and aluminum.

Chalcosiderite (Ap. III., p. 24), 25c. to $2.00; triclinic; hydrous phosphate of

Chalypite (Ap. II., p. 11), a meteoric carbide of iron.

Chloralluminite (Ap. III., p. 25), hydrous chloride of aluminum.

Chlorocalcite (Ap. II., p. 11), isometric; chloride of calcium.

Chloromagnesite (Ap. III., p. 25), massive; hydrous chloride of magnesium.

Chlorothionite (Ap. III., p. 25), massive; sulphate of potassium, and chloride of

Chlorotile (Ap. III., p. 26), orthorhombic; hydrous arsenate of copper. [copper.

Clarite (Ap. II., p. 12), monoclinic (?); sulph-arsenide of copper.

Cleveite (Ap. III., p. 27), 50c. to $2.50; isometric; hydrous oxide of uranium, lead, yttrium, &c.

Cliftonite (*A. J. S.*, Sep., '87), a cubical form of graphitic carbon.

Clinocrocite (Ap. III., p. 28), monoclinic (?); hydrous sulphate of aluminum, iron, sodium and potassium. [iron, aluminum and sodium.

Clinophaeite (Ap. III., p. 28), monoclinic (?); hydrous sulphate of potassium,

Cobaltomenite (*A. J. S.*, July, '82), monoclinic; selenite of cobalt.

Cohenite (*A. J. S.*, Jan., '90), isometric (?); carbide of iron, nickel and cobalt.

Colemanite (*A. J. S.*, June, '84, et. al.), 10c. to $5.00; monoclinic; hydrous borate of calcium.

Coloradoite (Ap. III., p. 29), 25c. to $2.50; massive; telluride of mercury.

Coronguite (Ap. III., p. 30), massive; antimonate of lead and silver.

Cossyrite (Ap. III., p. 31), triclinic; near Amphibole.

Cristobalite (*A. J. S.*, July, '87), binoxide of silicon in octahedral twins.

Cryphiolite (*A. J. S.*, May, '88), monoclinic; near Wagnerite.

Cryptohalite (Ap. III., p. 32), fluo-silicate of ammonium.

Cuprocalcite (Ap. III., p. 32), massive; hydrous carbonate of copper and calcium.

Cuspidine (Ap. III., p. 33), monoclinic; fluo-silicate of calcium.

Cyprusite (Ap. III., p. 33), a doubtful iron sulphate.

Dahllite (*A. J. S.*, Jan., '89), hydrous carbono-phosphate of calcium.

Daubréelite (Ap. III., p. 34), massive, meteoric sulphide of chromium and iron.

Daubreite (Ap. III., p. 35), massive; oxy-chloride of bismuth.

Daviesite (*A. J. S.*, Sept., '89), oxy-chloride of lead. [and magnesium.

Davreuxite (Ap. III., p. 35), orthorhombic; hydrous silicate of aluminum, manganese

Dawsonite (Ap. II., p. 16), monoclinic; hydrous carbonate of aluminum and sodium.
De Saulesite (*A. J. S.*, Oct., '89), massive; hydrous silicate of nickel and zinc.
Destinezite (Ap. III., p. 36), massive; an iron phosphate.
Diabantite (Ap. III., p. 37), massive; hydrous silicate aluminum, iron, magnesium, etc.
Diadelphite, see Aimatolite. [calcium and sodium.
Dickinsonite (Ap. III., p. 37), monoclinic; hydrous phosphate of iron, manganese,
Dietrichite (Ap. III., p. 39), monoclinic (?); hydrous sulphate of aluminum, zinc, iron, etc.
Dihydrothenardite (*A. J. S.*, May, '88), monoclinic; hydrous sulphate of sodium.
Dudgeonite (*A. J. S.*, Sept., '89), massive; hydrous arsenate of nickel and calcium.
Dumortierite (Ap. III., p. 39), 10c. to $2.00; orthorhombic; silicate of aluminum.
Dumreicherite (*A. J. S.*, May, '83), monoclinic (?); hydrous sulphate of magnesium and aluminum. [nesium.
Duporthite (Ap. III., p. 39), massive; hydrous silicate of aluminum, iron and mag-
Dürfeldtite (Ap. III., p. 40), massive; sulph-antimonide of lead, silver, manganese, etc.
Duxite (Ap. III., p. 40), a resin. [iron, cerium and sodium.
Dysanalyte (Ap. III., p. 40), 25c. to $1.50; isometric; columbo-tantalate of calcium,
Edisonite (*A. J. S.*, Oct., '88), orthorhombic; oxide of titanium.
Eggonite (Ap. III., p. 40), triclinic; silicate of cadmium.
Eichwaldite (*A. J. S.*, Dec., '83); borate of aluminum and iron.
Ekdemite (Ap. III., p. 41), tetragonal (?); chloro-arsenate of lead. [potassium.
Elpasolite (Sm. Rept., '85, Part I., p. 697), isometric; fluoride of aluminum, sodium and
Elroquite (Ap. III., p. 41), massive; hydrous silicate of aluminum and iron.
Emmonsite (*A. J. S.*, June, '86), monoclinic (?); tellurite of iron.
Empholite (*A. J. S.*, Aug., '83), orthorhombic; hydrous silicate of aluminum, etc.
Endlichite (*A. J. S.*, July, '85), 25c. to $2.50; hexagonal; a vanadium mimetite.
Enysite (Ap. III., p. 42), massive; hydrous sulphate of aluminum and copper.
Epigenite (*A. J. S.*, Feb., '90), hydrous silicate of manganese and magnesium.
Eriochalcite (Ap. III., p. 43), copper chloride.
Eucrasite (Ap. III., p. 43), closely related to thorite.
Eucryptite (Ap. III., p. 44), hexagonal; silicate of aluminum and lithium.
Facellite (*A. J. S.*, June, '89), hexagonal (?); silicate of aluminum and potassium. (Kaliophilite).
Fairfieldite (Ap. III., p.45), $1.00 to $3.50; triclinic; hydrous phosphate of calcium, manganese and iron. [and sodium.
Ferronatrite (*A. J. S.*, Sept., '89), 50c. to $5.00; massive; hydrous sulphate of iron
Ferrostibian (*A. J. S.*, Feb., '90), monoclinic; hydrous antimonate of manganese
Ferrotellurite (Ap. III., p. 46), tellurate of iron. [and iron.
Fiedlerite (*A. J. S.*, May, '88), monoclinic; hydrous chloride of lead.
Fillowite (Ap. III., p. 47), monoclinic; hydrous phosphate of manganese, iron, calcium and sodium.
Flinkite (*A. J. S.*, Sept., '89), orthorhombic; hydrous arsenate of manganese.
Franklandite (Ap. III., p. 48), massive; hydrous borate of sodium and calcium.
Freyalite (Ap. III., p. 48), hydrous silicate of cerium, thorium, etc.
Friedelite (Ap. III., p. 48), rhombohedral; hydrous silicate of manganese.
Frieseite (Ap. III., p. 116), orthorhombic; sulphide of silver and iron. [lead.
Galenobismutite (Ap. III., p. 49), 50c. to $2.50; massive; sulphide of bismuth and
Ganomalite (Ap. III., p. 49), massive; silicate of lead, manganese, calcium and magnesium.
Gastaldite (Ap. III., pp. 50 and 52), monoclinic; silicate, near glaucophane.
Gedanite (Ap. III., p. 51), a resin.
Gerhardtite (*A. J. S.*, July, '85), orthorhombic; hydrous nitrate of copper.
Ginilsite (Ap. III., p. 51), massive; hydrous silicate of calcium, iron, aluminum and magnesium.
Goyazite (*A. J. S.*, Sept., '84), hydrous phosphate of aluminum and calcium.
Guanajuatite (Ap. III., p. 53), orthorhombic; sulpho-selenide of bismuth.
Guanapite (Ap. I., p. 6, and Ap. III., p. 88), hydrous sulphate and oxalate of ammonium and potassium.
Guejarite (Ap. III., p. 54), orthorhombic; sulpho-antimonide of copper.
Guitermanite (*A. J. S.*, April, '85), 25c. to $2.50; sulph-arsenide of lead.

Hanksite (*A. J. S.*, Aug., '85), 25c. to $10.00; hexagonal; sulphato-carbonate of sodium. [nium.
Hannayite (Ap. III., p. 55), triclinic; hydrous phosphate of magnesium and ammo-
Harstigite (*A. J. S.*, May, '87), orthorhombic; hydrous silicate of calcium, aluminum, manganese, etc. [etc
Hatchettolite (Ap. III., p. 56), isometric; columbo-tantalate of uranium, calcium,
Heliophyllite (*A. J. S.*, June '89), orthorhombic; chloro-arsenate of lead.
Henwoodite (Ap. III., p. 57), massive; hydrous phosphate of aluminum and copper.
Herrengrundite (Ap. III., p. 57), monoclinic; hydrous sulphate of copper.
Hetærolite (Ap. III., p. 58), 10c. to $1.00; massive; oxide of zinc and manganese.
Heubachite (Ap. III., p. 58), massive; hydrous oxide of cobalt, nickel, iron, and
Hieratite (*A. J. S.*, July '82), isometric; fluo-silicate of potassium. [manganese.
Hofmannite (Ap. III., p. 59), a hydro-carbon.
Hohmannite (*A. J. S.*, Aug. '88), $1.00 to $5.00; hydrous sulphate of iron.
Homilite (Ap. III., p. 59), 50c. to $3.50; monoclinic; boro-silicate of calcium and
Horsfordite (*A. J. S.*, Aug. '88), massive; antimonide of copper. [iron.
Huminite (Ap. III., p. 60), a hydro-carbon.
Huntilite (Ap. III., pp. 60 and 71), $1.00 to $3.50; massive; arsenide of silver.
Hyalotekite (Ap. III., p. 60), massive; silicate of lead, barium, and calcium.
Hydrargyrite (Ap. II., p. 8), oxide of mercury.
Hydrocerussite (Ap. III., p. 61), hydrous carbonate of lead.
Hydrocuprite (Ap. II., p. 28), 50c. to $2.50; massive; hydrous oxide of copper.
Hydrofluorite (Ap. III., p. 61), hydrofluoric acid gas.
Hydrofranklinite (Ap. III., p. 61), hydrous oxide of zinc, manganese, and iron.
Hydrogiobertite (*A. J. S.*, June '86), hydrous carbonate of magnesium.
Hydrohalite (Ap. II., p. 29), a hydrous chloride of sodium. [aluminum and sodium.
Hydronephelite (*A. J. S.*, Apr '86), 10c. to $1.00; massive; hydrous silicate of
Hydroplumbite (*A. J. S.*, Sept. '89), hydrous oxide of lead. [nesium, and calcium.
Hydrorhodonite (Ap. III., p. 61), massive; hydrous silicate of manganese, mag-
Ihlëite (Ap. III., p. 62), massive; hydrous sulphate of iron.
Ilesite (Ap. III., p. 62), massive; hydrous sulphate of manganese, zinc, and iron.
Inesite (*A. J. S.*, June '89), 50c. to $2.00; triclinic; hydrous silicate of manganese and calcium.
Iodobromite (Ap. III., p. 63), isometric; bromo-chloride and iodide of silver.
Ionite (Ap. III., p. 63), a fossil hydrocarbon.
Jeremejeffite (*A. J. S.*, June, '83), hexagonal; borate of aluminum and iron.
Kainosite (*A. J. S.*, June, '86), orthorhombic or monoclinic; hydrous silico-carbonate of yttrium. erbium and calcium.
Kaliophilite (*A. J. S.*, May, '87), silicate of aluminum and potassium.
Kentrolite (Ap. III., p. 65), orthorhombic; silicate of manganese and lead.
Knoxvillite (*A. J. S.*, Jan., '90) hydrous sulphate of chromium.
Koninckite (*A. J. S.*, Apr. '85), massive; hydrous phosphate of iron.
Krennerite (Ap. III., p. 66), orthorhombic; telluride of gold, silver and copper.
Krönnkite (Ap. III., p. 66), triclinic (?); hydrous sulphate of copper and sodium.
Langbanite (*A. J. S.*, July, '87), hexagonal; silicate of manganese with antimonate of iron.
Lansfordite (*A. J. S.*, Aug., '88), 50c. to $2.50; hydrous carbonate of magnesium.
Laubanite (*A. J. S.*, May, '88), massive; hydrous silicate of aluminum and calcium.
Laurionite (*A. J. S.*, May. '88), orthorhombic; hydrous chloride of lead.
Lautite (Ap. III., p. 67), orthorhombic; sulph-arsenide of copper.
Lavenite (*A. J. S.*, Mar., '86), monoclinic; silicate of zirconium, calcium, sodium, etc.
Lawrencite (Ap. III., p. 67), protochloride of iron.
Leidyite (Ap. III., p. 68), 10c. to $1.00; massive; hydrous silicate of aluminum, iron, magnesium and calcium.
Lepidophaeite (Ap. III., p. 130), massive; hydrous oxide of manganese and copper.
Leucochalcite (Ap. III., p. 69), massive; hydrous arsenate of copper.
Leucotile (Ap. III., p. 69), orthorhombic (?); hydrous silicate of magnesium, calcium, aluminum and iron.
Liskeardite (Ap. III., p. 70), 50c. to $2.00; massive; hydrous arsenate of aluminum.
Ludlamite (Ap. III., p. 70), 50c. to $2.50; monoclinic; hydrous phosphate of iron.
Magnolite (Ap. III., p. 72), tellurate of mercury (?).
Mallardite (Ap. III., p. 72), monoclinic; hydrous sulphate of manganese.

Manganosite (Ap. III., p. 73), isometric; protoxide of manganese. [ganese, etc.
Manganostibiite (*A. J. S.*, Sept., '84), orthorhombic (?); arseno-antimonate of man-
Marmairolite (Ap. III., p. 74), monoclinic (?); silicate of magnesium, calcium,
Martinite (*A. J. S.*, May,'88), hydrous phosphate of calcium. [sodium, potassium, etc.
Matricite (Ap. III., p. 74), massive; hydrous silicate of magnesium. [calcium.
Mazapilite (*A. J. S.*, Nov., '88, et al), orthorhombic: hydrous arsenate of iron and
Melanocerite (*A. J. S.*, May, '83), hexagonal; silicate of calcium, cerium, etc.
Melanophlogite (Ap. III., p. 74), cubical binoxide of silicon.
Melanosiderite (Ap. III., p. 75), massive; hydrous silicate of iron.
Melanotekite (Ap. III., p. 75), massive; silicate of lead and iron.
Melanothallite (Ap. III., p. 75), chloride of copper.
Messelite (*A. J. S.*, Jan. '90), triclinic; hydrous phosphate of calcium and iron.
Metastibnite (*A. J. S.*, June '89), red sesquisulphide of antimony.
Michel-Lévyte (*A. J. S.*, Sept. '89), monoclinic barite (see also *A. J. S.*, Jan. '90.)
Microcline (Ap. III., p. 80), 5c. to $5.00; triclinic; silicate of aluminum and
Var. I., Amazonstone, 5c. to $5.00; 2. Chesterlite, 10c. to $2.00. [potassium.
3. Perthite, 25c. to $1.00.
Milarite (Ap. I., p. 10; II., p. 39; III.. p. 81), 50c. to $2.50; orthorhombic; hydrous
silicate of aluminum, calcium and potassium.
Miriquidite (Ap. II, p. 40), hexagonal; phospho-arsenate of lead and iron(?).
Mixite (Ap. III., p. 82), 25c. to $4.00; monoclinic(?) or triclinic (?); hydrous arse-
nate of copper and bismuth.
Molybdomenite (*A. J. S.*, July '82), orthorhombic; selenite of lead.
Monetite (*A. J. S.*, May '82), hydrous phosphate of calcium.
Monite (*A. J. S.*, May '82), hydrous phosphate of calcium. [sodium and potassium.
Monzonite (Ap. I., p. 11), massive; silicate of aluminum, calcium, magnesium, iron,
Mottramite (Ap. III., p. 83), massive; hydrous vanadate of lead and copper.
Napalite (*A. J. S.*, Jan. '90), a hydrocarbon.
Neocyanite (Ap. III., p. 84), monoclinic; anhydrous silicate of copper.
Nesquehonite (*A. J. S.*, Feb. '90), 50c. to $2.50; orthorhombic; hydrous carbonate
Neudorfite (Ap. III., p. 84), a hydrocarbon. [of magnesium.
Newberyite (Ap. III., p. 84), orthorhombic; hydrous phosphate of magnesium.
Niccochromite (Ap. III., p. 85), massive; "dichromate of lead"(?)
Nitrobarite (Ap. III., p. 85), isometric; nitrate of barium.
Nitroglauberite (Ap. II., p. 41), hydrous nitrate and sulphate of sodium.
Nivenite (*A. J. S.*, Dec. '89), $1.00 to $5.00; isometric (?); hydrous uranate of tho-
rium, yttrium and lead. [nesium.
Nocerite (Ap. III., p. 85), 25c. to $2.00; hexagonal; fluoride of calcium and mag-
Nordenskiöldite (*A. J. S.* May '88), rhombohedral; borate of calcium and tin.
Ochrolite (*A. J. S.*, June '89), orthorhombic; chloro-antimonate of lead.
Orileyite (Ap. I., p. 12), massive; arsenide of copper and iron(?).
Osbornite (Ap. I., p. 12), meteoric oxysulphide of titanium and calcium(?).
Oxammite (Ap. III., p. 88), probably identical with Guanapite.
Paposite (*A. J. S.* June '89), hydrous sulphate of iron.
Peckhamite (Ap. III., p. 89), meteoric silicate of magnesium and iron.
Penwithite (Ap. III., p. 90), massive; hydrous silicate of manganese.
Phillipite (Ap. III., p. 92), massive; hydrous sulphate of copper and iron.
Phosphochromite (Ap. I., p. 9 and III., p. 92), massive; phospho-chromate of lead
and copper.
Phosphuranylite (Ap. III., p. 92), massive; hydrous phosphate of uranium.
Picite (Ap. III., p. 93), massive; hydrous phosphate of iron. [and aluminum.
Picroallumogene (Ap. III., p. 93), 25c. to $2.50; hydrous sulphate of magnesium
Picroepidote (*A. J. S.*, June,'83), monoclinic; silicate of aluminum and magnesium.
Pilinite (Ap. III., p. 93), orthorhombic; hydrous silicate of aluminum, calcium and
lithium.
Pilolite (Ap. III., p. 94), massive; hydrous silicate of magnesium and aluminum.
Pinnoite (*A. J. S.*, Mar., '86), tetragonal; hydrous borate of magnesium.
Plagiocitrite (Ap. III., p. 95), monoclinic or triclinic; hydrous sulphate of aluminum,
iron, sodium and potassium.
Pleonectite (*A. J. S.*, Sept., '89), massive; chloro-antimonio-arsenate of lead.
Pleurasite (*A. J. S.*, Feb., '90), chloro-arsenate of iron and manganese.
Plumbomanganite (Ap. III., p. 95), massive; sulphide of manganese and lead.

Plumbonacrite (*A. J. S.*, Sept., '89), hydrous carbonate of lead.

Plumbostannite (Ap. III., p. 95), massive; sulph-antimonide of lead, tin and iron.

Polyarsenite (*A. J. S.*, Mar., '86), arsenate of manganese.

Polydymite (Ap. III., p. 95), isometric; sulphide of nickel.

Posepnyte (Ap. III., p. 96), a hydrocarbon.

Proidonite (Ap. III., p. 97), fluoride of silicon.

Pseudobrookite (Ap. III., p. 97), 50c. to $1.50; orthorhombic; titanate of iron.

Pseudocotunnite (Ap. III., p. 97), chloride of lead and potassium. [calcium, etc.

Pseudonatrolite (Ap. III., p. 98), orthorhombic (?); hydrous silicate of aluminum,

Psittacinite (Ap. III., p. 98), massive; hydrous vanadate of lead and copper.

Ptilolite (*A. J. S.*, Aug., '86), hydrous silicate of aluminum, calcium, potassium and sodium.

Pyrophosphorite (Ap. III., p. 100), massive; phosphate of calcium and magnesium.

Quenstedtite (*A. J. S.*, Aug., '88), monoclinic; hydrous sulphate of iron.

Randite (Ap. III., p. 102), 25c. to $1.50; hydrous carbonate of calcium and uranium.

Raphisiderite (*A. J. S.*, Jan. '90), sesquioxide of iron.

Roddingite (Ap. III., p. 102), orthorhombic; hydrous phosphate of manganese.

Redingtonite (*A. J. S.*, Jan., '90), triclinic (?); hydrous sulphate of chromium.

Redondite (Ap. I., p. 18), massive; hydrous phosphate of aluminum and iron.

Reinite (Ap. III., p. 102), tetragonal; tungstate of iron.

Retzbanyite (*A. J. S.*, Dec., '82), sulphide of bismuth and lead.

Rhabdite (Ap. III., p. 103), meteoric phosphide of iron, with sulphur and arsenic.

Rhabdophane (Ap. III., p. 103), hydrous phosphate of yttrium, erbium, lanthanum and didymium.

Rhodotilite (*A. J. S.*, June, '89), triclinic; hydrous silicate of manganese and calcium.

Richellite (*A. J. S.*, Nov., '83), massive; hydrous fluo-phosphate of iron.

Riebeckite (*A. J. S.*, Nov., '88), silicate of iron and sodium.

Rinkite (*A. J. S.*, Jan., '85), monoclinic; titano-silicate of calcium, cerium, etc., with fluoride of sodium. [Samarskite.

Rogersite (Ap. III., p. 104), 25c. to $1.00; massive; decomposition product of

Roscoelite (Ap. III., p. 104), $1.00 to $5.00; massive; hydrous silicate of vanadium, aluminum, potassium, etc. [ium, etc.

Rosenbuschite (*A. J. S.*, May, '88), monoclinic; silicate of calcium, sodium, zircon-

Sarkinite (*A. J. S.*, Mar., '86), arsenate of manganese.

Schneebergite (Ap. III., p. 107), isometric; antimonate of calcium, etc.

Schraufite (Ap. III., p. 107), a hydrocarbon.

Semseyite (Ap. III., p. 108), sulph-antimonide of lead.

Serpierite (Ap. III., p. 109), orthorhombic; hydrous basic sulphate of copper and

Siderazot (Ap. III., p. 109), massive; nitride of iron. [zinc.

Sideronatrite (Ap. III., p. 109), massive; hydrous sulphate of iron and sodium.

Siegburgite (Ap. II., p. 51), 25c. to $1.00; a hydrocarbon.

Silfbergite (*A. J. S.*, Aug. '83); silicate of iron, manganese, magnesium, and calcium.

Sipylite (Ap. III., p. 110), tetragonal; columbate of erbium, lanthanum, didymium, etc. [inum.

Sonomaite (Ap. III., p. 93), massive; hydrous sulphate of magnesium and alum-

Spangolite (*A. J. S.*. May '90), hexagonal; hydrous chloro-sulphate of copper and aluminum. (See page .) [(See p.—)

Sperrylite (*A. J. S.*, Jan. '89), $1.00 to $10.00; isometric; arsenide of platinum

Sphaerocobaltite (Ap. III., p. 110), hexagonal; carbonate of cobalt.

Spodiosite (Ap. III., p. 112), orthorhombic; fluo-phosphate of calcium.

Steenstrupine (*A. J. S.*, Feb. '83), hexagonal; hydrous silicate of lanthanum, didymium, cerium, thorium, etc. [iron.

Strengite (Ap. III., p. 116), $1.00 to $3.50; orthorhombic; hydrous phosphate of

Stützite (Ap. III., p. 117), monoclinic; telluride of silver.

Stuvenite (*A.J.S.*, Jan. '87), hydrous sulphate of aluminum, sodium and magnesium.

Sulphohalite (*A. J. S.*, Dec. '88), isometric; sulphato-chloride of sodium.

Synadelphite (Sm. Rept. '84, p. 557), monoclinic; hydrous arsenate of manganese, aluminum and iron.

Szaboite (Ap. III., p. 118), 50c. to $1.50; triclinic; silicate of iron and calcium.

Symikite (Ap. III., p. 118), massive; hydrous sulphate of manganese.

Talcosite (Ap. I., p. 15), hydrous silicate of aluminum.

Tapalpite (Ap. I., p. 15, II., p. 55), massive; sulph-telluride of bismuth and silver.

Tarapacaite (Ap. III., p. 119), chromate of potassium.

Tellurate of copper and lead (Ap. III., p. 55). [uranium.

Thorogummite (*A. J. S.*, Dec. '89), 50c. to $5.00; hydrous silicate of thorium and

Thrombolite (Ap. III., p. 123), massive; hydrous oxide of copper and antimony (?)

Tobermorite (Ap. III., p. 123), massive; hydrous silicate of calcium.

Tocornalite (Ap. II., p. 56), massive; iodide of silver and mercury.

Triploidite (Ap. III., p. 125), monoclinic; hydrous phosphate of manganese and iron.

Trippkeite (Ap III., p. 125), tetragonal; arsenite of copper.

Tritochorite (Ap. III., p. 125 and 44), massive; vanadate of lead, zinc and copper.

Tysonite (Ap. III., p. 126), $1.00 to $5.00; hexagonal; fluoride of cerium, lanthanum and didymium.

Uintahite (*A. J. S.*, Mar. '86), 10c. to $1.00; a hydrocarbon.

Uranocircite (Ap. III., p. 127), $1.00 to $2.50; orthorhombic; hydrous phosphate of uranium and calcium.

Uranopilite (*A. J. S.*, Dec. '82), hydrous silicate of uranium and calcium.

Uranothallite (*A. J. S.*, July '82), orthorhombic; hydrous carbonate of calcium and uranium.

Uranothorite (Ap. III., p. 127 and 122), massive; hydrous silicate of thorium, uranium, etc. [and calcium.

Uranotil (Ap. I., p. 16), 25c. to $2.50; orthorhombic; hydrous silicate of uranium

Urusite (Ap. III., p. 128 and 109), orthorhombic; hydrous sulphate of iron and sodium.

Utahite (*A. J. S.*, Sept. '84), 25c. to $2.00; hexagonal; hydrous sulphate of iron.

Vesbine (Ap. III., p. 129), vanadate of aluminum(?).

Warrenite (*A. J. S.*, Jan. '90 and Dec. '88), massive; sulph-antimonite of lead and iron. [calcium, sodium, potassium, etc.

Wattevillite (Ap. III., p. 131), orthorhombic or monoclinic; hydrous sulphate of

Webskyite (*A. J. S.*, July '87), hydrous silicate of magnesium, aluminum and iron.

Werthemanite (Ap. III., p. 131), massive; hydrous sulphate of aluminum.

Wurtzilite (*A. J. S.*, Feb. '90), a hydrocarbon.

Xanthiosite (Ap. II., p. 62), arsenate of nickel.

Xanthoarsenite (Sm. Rept., '84, p. 557), hydrous arsenate of manganese, &c.

Yttrialite (*A. J. S.*, Dec. '89), 25c. to $5.00; massive; silicate of yttrium and thorium.

Zincaluminite (Ap. III., p. 133), hexagonal (?); hydrous sulphate of zinc and aluminum. [&c.

Zunyite (*A. J. S.*, Apr. '85), 10c. to $1.50; isometric; hydrous silicate of aluminum,

Index.

THIS Index contains the names of all described mineral species, and a very large number of important synonyms and varieties. The number attached is the species number in Dana's System of Mineralogy, except in the case of the new minerals whose exact place in the System has not yet been designated. The *pages in this catalogue* on which such minerals are described are given in these instances, and by reference to them, the crystallographic form and chemical composition may be ascertained, and the places in which they are more fully described are also given. Abbreviations are as follows: p.=page in this catalogue; s.=synonym; v.=variety; n.=near.